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THE USE OF HIGH FREQUENCY CURRENTS FROM THE SURGEON'S STANDPOINT*

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SURGERY being mechanical, it is not difficult to understand the readiness with which those devoting their efforts in this particular field of medical science should grasp anything that mechanically aids them in their work.

In the efforts to destroy infection, or abnormal cells, as in cancer, surgeons have used from time immemorial heat in a concentrated form to serve their purpose.

First was the use of the hot iron, heated by being placed in the fire, and allowed to remain until the desired temperature was obtained, then applied to the parts to be destroyed. The difficulties of this method are obvious.

Then came the Paquilin cautery, heated by a benzine vapor. It was a neat little device, but as uncertain in its actions as the predictions of the weather prophet or the verdict of a jury. It worked fine at the instrument store, but by the time it had been carried to the operating room, for some reason, many times when most needed, it simply would not produce results.

Then came the electric cautery—the surgeons' ideal. It was more scientific, the energy being in action during the time of use, thereby maintaining a more even heat. Generally, it was in working order on short notice. But it, too, had its many disadvantages. Heavy, cumbersome, cool when most needed, many times it burned parts not intended to be heated in spite of every effort put forth by the operator.

In 1907 Doyen used the d'Arsonval current for tissue destruction. But it was many years before its use became at all generally known. And today we are just entering into that period in surgery where high frequency currents are being appreciated, their many uses evolved and their many advantages over former methods demonstrated. Seeing is believing, and the surgeon who once sees his colleague use this energy in the place

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of the time honored cautery will be converted to its use and, once used, will convince the most skeptical of its advantages.

The writer today never uses a cautery except in stomach or intestinal work to cut and disinfect at the same time. All other work can be done so much more satisfactorily by the high frequency currents that no argument remains.

Always ready, it is never hot until wanted, cold the moment the current is broken, producing any amount of heat that may be desired, yet light and easy to handle. It can be controlled to the point where effect is needed. The last mentioned advantage enables us to use it in cavities that otherwise would be inaccessible, such for instance as the bladder, mouth, rectum or vagina.

Again the results obtained are different from the cautery. There the tissues are charred, or nearly so, while with the high frequency currents they are coagulated, controlling hemorrhage not only at the time of operation, but leaving little danger of secondary bleeding from sloughing. No pain follows the work, as terminal nerves are sealed by the heat.

So also are the lymphatics closed that go from the field of pathology that is under manipulation. Here again the action of the high frequency currents differs from the cautery. This action is most desirable, not only in malignancy, but in the infections coming under the surgeon's care. What better illustration could be had than the general toxic symptoms shown in carbuncle, or the infected cancer of the cervix, or that more simple condition so frequently seen, *viz.*, Bartholinitis? In either of these and many others the real danger to the patient lies, not so much in the local destruction of tissues as in the general systemic changes brought about by the absorption from the sight of pathology.

As an example of conditions above referred to, the following case is cited: An elderly lady was sent to us with an enormous carbuncle on the chin. This condition had existed until she was carrying a mass the size of which was sufficient to not only cover the entire chin, but extended well down on the neck and over the sides of the face.

Patient was delirious, had pulse of 120 and a temperature registering 104 degrees. Her general condition was bad. To attempt to remove this under a general anesthesia would have invited a severe hemorrhage, increase in the depression already present and most likely culminate fatally. Knowing that something must be done at once, it was decided to administer a full strength morphine, hyoscine and cactine tablet, waiting a sufficient time to get its full effect. Age perhaps aided us in this, and after one and a half hours its full effect was present and deep sleep came on without any signs suggesting opium poisoning. She was removed to the operating room and the entire mass was removed by the electrocoagulation needle in less than twenty minutes. No bleeding was experienced, and the only instruments used were the coagulation needle, a heavy pair of tissue forceps and large

curette. The work was begun by going around the base of the mass, then attacking the mass at every point until the entire field had been well coagulated down to what we supposed to be healthy tissue.

The devitalized tissue was removed by the curette and any point that was not healthy was again coagulated until we were sure that all infection was removed. The patient was placed in bed and hot Dakin's solution was applied to the area involved. In less than twelve hours all symptoms had subsided except, of course, the weakened condition naturally following severe infection. This patient was never in any pain after the operation and in one week returned home with a clean wound, partly healed, and with the process of repair going along as rapidly as if no infection had been present. I feel sure that under the old method of knife and carbolic acid this patient would not have been so fortunate.

Many cases of like character have been treated. Those of a more simple nature are handled in the office and under local anesthesia. Where local anesthesia is used it must be remembered to not use as much current nor for as long a time as in those operated upon under a general anesthetic. The tissue infiltrated with fluid generates steam and a wider destruction than is desired will be had unless half the current is used and for about one-half the time generally employed for such cases.

Under the use of local anesthetics the high frequency currents offer the ideal way of removal of all small growths about the face that are already malignant or may become so. Only a few drops of a one per cent novocaine is all that is needed to infiltrate the tissue surrounding the growth, and in a few seconds the operation is complete. No bleeding is had and in many instances no dressings are needed, as the tissue

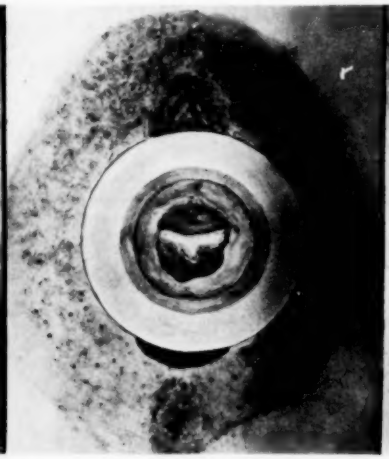


Fig. 1.—Condylomata of vulva. Easy to relieve by dessicating the warts until they are dehydrated.

Fig. 2.—Erosion of cervix. Relieved by dessication of entire area, either by Oudin or d'Arsonval current.

Fig. 3.—Abscess of Bartholin gland. Best treated by either opening, then electrocoagulate the sac in its entirety, or open and wait for two or three days, then coagulate the sac.

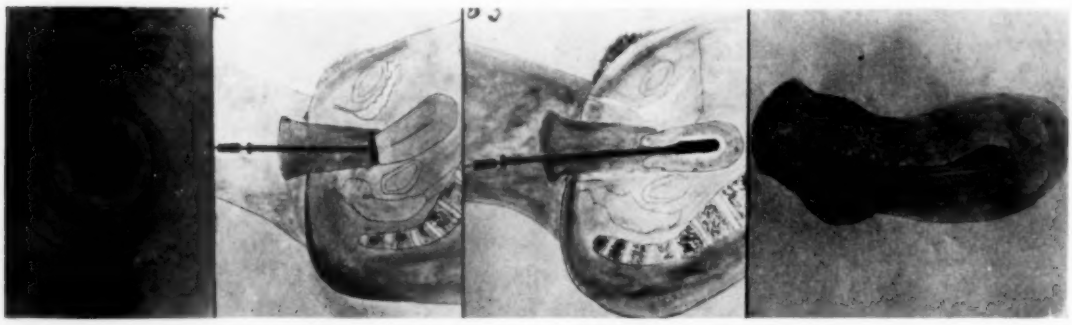
is hardened and made leather-like and will take care of itself in the healing process.

Again, in the larger work, nothing equals the coagulation methods in the treatment of cancers of the cervix or body of the uterus. If the growth is amenable to operation, then it can be done by this method far better, in the writer's opinion, than by the use of the knife. For many years it was my custom, as is true of all surgeons, to operate for cancer of the female organs, doing as wide a removal as was possible to do. A careful check of these cases was kept and an operating mortality was observed of 10 per cent, which is the rule with any extensive removal of these organs and surrounding tissues looking toward a complete cure.

The return of cancer was noted in many and, to say the least, results were far from satisfactory. The darkest page in medical history is the one dealing with uterine cancer.

In making observations as to results obtained by other surgeons, some were found whose work was outstanding, not only as to apparent cures, but as to mortality and morbidity. These men were using high frequency currents to obtain coagulation of the structures, instead of attempting a removal. It was obvious to me their work possessed merit and, on the stimulus thus obtained, the writer familiarized himself with the method used and begun to do less and less cutting on these cases. Today hysterectomy is seldom done, and the results are more satisfactory to the patient, and recurrence is less frequent. Its use does not preclude the using of radium or x rays if so desired.

Familiarize yourself with coagulation, as done with the high frequency currents, and you will be so well pleased that operations will rarely be made on these cases. Some will ask how you do it. In reply I will say that any machine that delivers a flexible current, light enough to permit its use in removal of small growths about the face and capable of being stepped up to 3,000 milliamperes or more, will do any and all kinds of work, including the uterine work. Here from 1,500 to 3,500 milliamperes is needed to do quick and bloodless destruction of tissue so complete that if cure is to be had it is thus obtained.



Figs. 4, 5, 6 and 7.—Cancer of uterus. Electrocoagulate all tissues involved and out into the healthy as far as desired to destroy all involved tissue.

Again in the relief from many of the simpler conditions frequently encountered in gynecological work we have the same handmaid always ready to aid us. Such conditions as condylomatous warts, erosions of the cervix and urethral caruncles are easily and readily removed by a small and feathery current obtained from either the Oudin or d'Arsonval terminals. My own preference is towards the latter, since the voltage is lower, bringing it under more perfect control.

In those cases of abscess involving the Bartholin glands, incise the gland as you would ordinarily do to release the accumulated pus. Then with your needle coagulate the entire pus sack, destroying the wall of the gland, and pack with gauze. You will find that a complete removal can thus be done that is far simpler than excision after the abscess is healed. To those who have removed these glands it is not necessary to remind you of the bloody little task that always confronts you in this work. Try the above method and you will be surprised at the ease with which good results can be obtained.

In the high frequency currents we have not only an agent for complete destruction of tissues, but one that is of immense value in the simple application of heat to any part or any size area to be treated. Under this heading one naturally thinks of its use in the cervical canal for the relief of infections that are known to be affected by a slight elevation of temperature above the normal, yet within the range of safety as regards the life of the living cells.

While my experience in gonorrheal infections has not been as wide as some others in this country, and in some cases has not been the most satisfactory, I am constrained to believe that diathermy has a place that is as likely of results as most any treatment in use today. The principle is sound and, with proper technique, relief may be had from this far-reaching and stubborn condition. So, also, do we have in its use a remedial agent of more than passing interest in the treatment of that most common condition, cervical endometritis.

While I admit being decidedly partial to the use of galvanism, with the mercury coated copper electrode, there may be those present who have no galvanic current available, and to such I suggest diathermy as being a means worthy of your consideration. Remember, in its application to mucous surfaces, always stay well within the tolerance of the patient.

Again, where the use of heat is desired to the pelvic structures, no better way can be thought of than the use of diathermy. You obtain a heat that really reaches the parts affected, because you have a heat generated within the tissues from the resistance to the current as is seen in the daily use of light bulbs, flat irons, etc. In the tissues its action can be easily demonstrated by anyone so inclined by interposing a piece of liver structure between two electrodes and placing a thermometer in the center. After from ten to twelve minutes you will see results by the elevation of the temperature in the tissue.

The above experiment will also suggest the use of diathermy to organs where it is desired to increase their activity. This is frequently true in treating chronic liver conditions. Take, if you please, the following case: Dr. F., white, age 50, came to us with the following history: Nearly thirty years ago, following a case of protracted diarrhea, he began to have what is commonly described as a sluggish liver. His bowels were constipated, evacuating light colored stools. There was tenderness over liver from which relief was never complete. There was a sallow color of skin, and an inability to eat many articles of diet. He had been treated by many different methods, including a rest in a sanitarium for several weeks, where diet, baths, etc., were all tried. Some few years ago, upon the advice of an enthusiast along the line of colonic infection, he had a short circuit done of the large bowel. So much trouble followed this that after a few months he had all the ascending colon and part of the transverse removed. No pathology was found at either time in the region of the liver or gallbladder.

Still no relief came, and only by the frequent use of calomel was he able to continue his practice.

This man later received 500 milliamperes through his liver every other day, by having placed on his body a six by eight inch pad anterioposterior. The above amount was allowed to be used for from twenty to thirty minutes each treatment, beginning with the shorter time and increasing to the maximum amount.

Better results will be had by lower milliamperage for longer time than with higher current for shorter time. This applies to any case where diathermy is used, and especially to that class under consideration. If you have not tried this method in chronic liver cases you will be agreeably surprised at the results obtained.

No liver should be treated by diathermy when an acute gallbladder exists, as you perchance might release the infection into the system. But in the more chronic cases nothing will serve you better than the above. In many such patients where gallbladder drainage was done or being done, the results were not noticed or were they, if noticed, as good as when diathermy was given.

Treatment should be given two or three times a week if the patient is not suffering too much; if so, treat every day until symptoms are relieved.

Another condition in the abdomen where diathermy is very helpful is in the female, where for any reason it is desirable to heat the pelvic structures. This can be accomplished by placing an electrode either in the vagina or rectum and the other either anterior or posterior, as thought best, to heat the site being treated. Time enough should be allowed for the current to penetrate deep structures. A treatment of less than twenty or thirty minutes will not do much good. These patients should be treated every day to avert suffering, then every other day, then twice a week. Where it is possible to use the high frequency currents for heat, you will find it far superior to hot water bottles, clothes, etc. Not only does

the heat penetrate and give relief, but absorption of exudates will be hastened and furthered. What would have been only a partial relief afforded by nature is assisted to the point of approaching cure.

Many such cases have come under our observation and only a small percentage have finally come to operation. So, in fact, it is really hard to determine for many reasons those that will recover sufficient to not have discomfort requiring a later operation, and those that do not get sufficient relief to warrant continuing treatment. I have never regretted giving the patient the benefit of the doubt.

Again in general work, joint conditions offer a fertile field for the use of high frequency currents. High frequency has another use in the constructive heating of tissue that has either been injured, the so-called "sprain," or irritation to the bursa of the joint which necessitates such efforts on the part of the patient for protection as to make them, if no more, at least semi-invalids, unable to fully fill the position to which they had formerly been employed.

The following case is illustrative of some of these unfortunates: Miss T., white, age 50, clerk. While standing at the counter waiting on customers and while in a stooping position to remove an article from beneath the counter, she experienced a locking of the left knee joint. The joint could not be straightened by natural or artificial efforts to more than two-thirds the normal extension. Pain was severe at all times, but more especially when an attempt was made to either walk or stand.

The patient had been in this condition for four months when she came to the office to consult us relative to her future. She at this time was walking with a cane and with difficulty, being able to put but little weight on the disabled limb.

An x ray of the joint was taken in both a lateral and an anteroposterior position. No definite pathology was found. What was suspicious of a joint mouse was observed at one point. At many places evidences of arthritis were seen, as was also present in one of the hands.

Two conditions demanded attention, *viz.*, the pain and the flexion of the limb on the thigh to that degree as to make walking almost impossible.

Nothing was promised this case as to cure, merely saying to her that we believed we could give her better movement of the joint and possibly some relief from pain.

She was given diathermy to the joint, 400 milliamperes, for twenty minutes. While the joint structures were still warm, a trained masseur began the systematic movements of the joint, by first increasing the flexion, then making efforts at extension. It was not many days until practically all pain on standing had ceased and the extension was much better than when treatments were begun. The treatments at first were given three times a week, for three weeks, after which she was so much improved that

she was told to come twice a week for two weeks, now only once a week.

She is employed at her position, that of clerk, walking without a cane, stands erect, and the limb can easily be extended to full extension without any difficulty.

She had previously been told by several physicians that nothing could be done, who advised that at her age of fifty she should not expect the impossible. Again the high frequency currents have aided the surgeon in accomplishing that which otherwise would have been impossible.

This case is not a miracle, neither is it an exceptional one selected for report, but it is an example of what can be done by anyone properly using this agent.

There is one thing that we should all bear in mind, and that is it doesn't make any difference what energy we are using, whether it be galvanism, x rays, ultra violet lights, either water cooled or air cooled, or phototherapy lamps, we are dealing with one and the same thing. The only difference is in the wave length of the light being used. That is the basic principle on which all of this work is founded, so far as the currents are concerned—it is a matter entirely of wave lengths and nothing else.

By quoting some ordinary cases that frequent the surgeon's office from day to day, and by making my remarks to you a little clearer perhaps by calling attention to some crude drawings, I have attempted to depict the commoner cases that come into your office from day to day for relief.

I have included some illustrations of a few of the more common gynecological conditions.

A drawing that I was able to include was of some warts that we so frequently see about the external genitalia. The simplest and most satisfactory treatment is to dehydrate them with a high frequency current. You can do it with the unipolar current off the Oudin pole, or with the bipolar. I like the bipolar because of its lower voltage and minimal shock.

Put the patient on the autocondensation pad with the connection to the Oudin current or let him hold the autocondensation handle in his hands. Then with a wire in your own hand that is covered with a rubber glove dehydrate these until they are white and they disappear. You can do that with a local anesthetic, using a four per cent novocain or procain, or you can inject a little into the area and dehydrate the warts and the patient goes home.

The second drawing presented is an attempt to reproduce the field of an eroded cervix. We are all familiar with how long it takes to treat those with ichthyol, glycerine, iodin, and so forth.

You can treat this condition either with the Oudin current or the bipolar current and simply desiccate the entire area through a glass speculum. There is no danger in that way of getting the current to the vaginal wall and burning. Dehydrate the entire area and desiccate it with your needle so that it looks white and dry. The patient does not need any further after-treatment.

Their convalescence is undisturbed and even douches are unnecessary. In about a week the entire cervix is practically healed.

Cervical polyps may be treated in much the same manner. Instead of scraping them out and attempting to cauterize with carbolic acid or iodin, as was the old method, use a little local anesthetic and with a needle on the bipolar current coagulate the base of the little growth.

Urethral caruncles are also frequent occurrences. Those of you who do gynecological work know how frequently they recur. They are not malignant. There is practically no tendency for them to become so, yet they recur. The quickest way is to take just a drop or two of anesthesia, local anesthesize the base, using preferably a one-half to one per cent solution of novocain. Dehydrate down to and including the base and the trouble will not recur one time in fifty. If you cut them out and touch them up with a little carbolic acid, they frequently recur. With the high frequency current you can get them out readily. There is no bleeding; there is no pain. No after-treatment is really needed; however, hot saline applications to the urethral outlet for a few hours when she gets home may aid the recovery and ease the patient's mind that something is being done for her.

The next plate is supposed to represent an enlarged Bartholin gland. They can be surgically removed only with difficulty; but really all you have to do is simply incise the gland or the abscessed sac, allow the pus to escape, then electrocoagulate the contents of the cavity and the sac wall. It will slough. You can hasten this by irrigations. The symptoms are immediately stopped, the sac wall comes away and the local condition is cured. Hyoscin, morphin and cactin or gas assist.

The fourth, fifth, sixth and seventh drawings illustrate cancer of the cervix and uterus. How many of us have looked into a speculum and seen a cervix where you could take your finger and hook out pieces of tissue? Previously, in treating these cases, I have done the Wertheim operation. I have taken these growths out through the vagina, and I have taken them out from above. I have gone well out from the pelvis into the glands and surrounding structure and with all that they frequently recurred. Lately I have used electrocoagulation. I go into these without preliminarily disturbing them. I think the less you disturb a cancer the less apt you are to have it disseminated about over the system, just as it is if you manipulate a breast. Someone the other day mentioned that in the clinic they were able to tell the cases that had been examined by a class of students. They had kept track of a series of cases and every woman who had a cancer of the breast that was examined by students for educational purposes had recurrences much more often than those who were examined very gently and just one time by the operating surgeon and had their operation done. If that be true of cancer of the breast, how much more true is it of cancer of the pelvis where we go in and disturb the protection the body is giving?

Many of these cases are inoperable. In these cases use a needle and electrocoagulation. If it is just the cervix, you can use a disc like that shown in figure 5. If it is so that we can, an electrode can be placed entirely into the uterus.

Here I use the needle, with from 12 to 1,500 milliamperes in the front and posteriorly near the rectum. On the side you can use 30 to 35,000 milliamperes and coagulate the entire structure. Push your needle well in, keeping your needle clean. Allow your needle to remain in position until you have bleached the tissues. Whenever the tissues are blanched out white, you have coagulated that area. Then move to another and do the same thing until you have gone all the way around.

I have been asked on several occasions if I would attempt to coagulate the entire body of the uterus. I have done that; but I would not advise a man to attempt it until he has some experience. I have not had a world of experience, of course, but I have had some. When you familiarize yourself with the action of the current and know how much it takes and are familiar with the pelvic structures you can as safely coagulate the body of the uterus as you can coagulate the cervix.

I have some cases in whom I would defy the gynecologists by examination to tell me whether I did a Wertheim operation or an electrocoagulation. They have never in this period of five years had a recurrence of the cancer. Of course, I realize that it is too soon yet to say that the cancer will not recur, but the point I want to make is that I did it successfully enough to get away with the entire body of the uterus and obtain union. This requires some time, usually twenty or thirty minutes. In one instance I consumed about forty minutes. It was an extensive case and that is one of the cases I have that has lived over a period of three and a half, nearly four years now, without any recurrences whatsoever. She had quite a mass out in the right broad ligament that received x ray dosage and she also had after the operation an application of radium. With all of it combined we got away with all of the uterus. She has no uterus left. I have examined her recently and there are no evidences of the uterine body at all. Her menses have entirely disappeared. That is too soon to say she is cured, but the treatment has at least relieved that terrible condition which she had when she came to me for treatment.

DISCUSSION

Dr. B. H. Hager (Madison, Wis.): I consider it a great opportunity to have listened to this paper because I feel that those of us who advocate electrocoagulation in the treatment of cervicitis and specific endocervicitis have really made a comeback today. It is very interesting to learn of the complete results that have been obtained through this form of treatment by a man who is actively engaged in the work.

I think the illustrations on the board show very well the types of cases that respond very well to this form of treatment. Cervical erosions and cervical carcinomata are the types of cases which I had hoped you would understand were the cases that we used electrocoagulation on. By electrocoagulation, of course, I mean a conservative coagulation, an electrocoagulation using

500 milliamperes and less. Of course, I realize that the intensity of destruction depends upon the intensity and duration of treatment, but in the mild form of electrocoagulation, I believe these cases can be tremendously benefited without producing any scar tissue or very little scar tissue. The scar tissues that we have seen have not been the hard type of scar tissues that were referred to yesterday.

We use cauterization in the treatment of corneal ulcer and we do not destroy the eye. We can apply this same reasoning in the treatment of these hyperplastic conditions of the cervix where we destroy the hyperplasia of the glands and the bacteria without producing contracture and scar formation.

Dr. G. A. Larsen (Hayward, Wis.): I have done a little work along this line and there is one part of it that I would like to have Dr. Willmoth give me some instruction on.

I have hesitated to treat cancer of the cervix for the reason that I didn't feel competent to know when I had introduced that needle deeply enough or not too deeply. Is there any guide which one could follow in introducing this needle into the tissues in the cervix so as to know when you have gone deep enough and yet not too deep?

Dr. Disraeli Kobak (Chicago, Ill.): This truly is a wonderful paper. I feel as though I have been placed in the shoes of Dr. Willmoth vicariously and have gone through all these operations with him. It was so clear. I have had a little experience in some of these conditions and I want to confirm Dr. Willmoth's experience. With one or two exceptions we practically do not differ.

I felt I was one of the first to use it and I see I have been antedated by Dr. Willmoth, and it is a compliment to me to have a man of his standing antedate me. The first one that I want to mention is the case of Bartholin infection. My technique differs a little bit, although it is practically the same. I make my incision the first day. I pack and I do my operation the following day so as to permit extensive drainage and removal of any possible pus higher up. Then I electrocoagulate the same as Dr. Willmoth does. I have never gone so far as to remove an entire uterus by electrocoagulation. I haven't the nerve of Dr. Willmoth, possibly I haven't the experience.

I did like the explanation of the electrocoagulation method of cervical carcinoma. You must completely remove the part infected and the doubt should be on the side of whether you have removed it or not, not whether you are going into it too deeply. There is no fear at all if you destroy healthy tissue. The fear is that you do not destroy sufficient of the unhealthy tissue. I really feel grateful for having been here to listen to a paper of this kind.

Dr. T. T. Gibson (Middlesboro, Ky.): The part that most interests me in Dr. Willmoth's paper is the part on the joints. In the coal fields we have so much of that kind of infection. You see them around the hospitals, lying in hospitals for months and months, and then getting up with a stiff joint. They always stay stiff. But since I have been using the diathermy on those joints, the patient usually goes to work within the first week.

Dr. A. D. Willmoth (Louisville, Ky.): The doctor asked how you would know the depth to go with your needle. That isn't very difficult to determine. Those of you who have done any gynecological work know how tough and fibrous, so to speak, the uterus is. If it is firm enough at all to get hold of with forceps, you pull it down and start with your needle around here. If it isn't and you are going into rotten structure, you push your needle into the soft structure and it will pass through just as easily as passing it through butter, until it gets to the normal uterine structure. You can push it through and when it strikes the solid structure there is that resistance that keeps you from go-

ing any farther without rather a positive push on the electrode.

Withdraw your needle a short distance. Withdraw your needle to about the point that you want to start. The electrode is usually drawn back from the solid structure. If you are going to destroy the entire uterus where you see it early enough and feel the condition has already gone rather up but not too extensively, go in through the cervix and take an angling position into the wall, starting up at the fundus, and keep working down as you come out.

I coagulate the entire uterus in that way. It can be done with a large electrode by pushing it into the uterus, but I prefer the needle.

Before you attempt to do any of this work, always test your machine so you are thoroughly familiar with it. Test it with a piece of beefsteak to note the amount of milliamperage and the number of seconds it is going to require you to do the amount of coagulation that you expect to do, remembering always, of course, that the circulation of blood through the tissue is going to delay the effect of the coagulation to a certain extent. But get a good working knowledge of the length of time and the amount of current to use by testing out your work on a piece of beefsteak.

APPLICATION OF RADIOLOGY AND PHYSIOTHERAPY TO GYNECOLOGY: A SYMPOSIUM

Part V—Diathermy

DIATHERMY IN GYNECOLOGY AND IN GENITO-URINARY PRACTICE*

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I wish to consider with you some of the more troublesome and common lesions seen in urologic practice that can be successfully treated in general practice. The frequency with which the specialist sees these cases and the long duration of the disease as evidenced by the patient's history warrants the belief that much of the annoyance and discomfort experienced by this group of patients can be alleviated by the early application of surgical diathermy.

NONSPECIFIC ENDOCERVICITIS

Persistent leucorrhea not a sequela of gonorrhea is often the result of a chronic endocervicitis. In the multiparae it is often associated with laceration and erosion of the cervical lips with hyperplasia of the cervical mucosa. The mucopurulent discharge produces an irritation which results in an erosion of the mucosa about the external os. As a rule the more chronic the process the fewer the pus cells and the greater the mucous. In the low grade inflammation of the cervical mucosa the hypertrophy of the fibro-muscular tissue often overshadows the glandular hyperplasia. Such is the condition often seen with Nabothian cysts.

Symptomatology: Locally we may have anything or nothing in the subjective symp-

*Read before the Fourth Annual Meeting of the American College of Physical Therapy, October 21, 1925.

tomatology. Metrorrhagia and obscure pelvic pains, together with vaginal discharge, nervousness and sterility, singly or together, are occasionally complained of.

Pathology: Remote pathology and symptoms with the cervix as the primary focus of infection occurs in no small number of cases. It cannot be denied that cervical infection is a factor in systemic diseases, as shown by the cases of neuritis, pyelonephritis and arthritis deformans attributable to it. There is no reason why it should not be just as important in the elimination of foci of infection as the teeth, tonsils and sinuses, and in the male, the prostate and seminal vesicles.

Endocervicitis and cervicitis are probably always infectious processes. While trauma is frequently the contributing factor, the essential cause is bacterial invasion. The secret of therapy would, therefore, primarily be to eliminate the bacterial flora.

SPECIFIC ENDOCERVICITIS

The vulnerability of the cervix to gonorrheal invasion is well known. As a rule the gonococcus does not thrive well in closed cavities and when infection does occur it soon becomes replaced by other bacteria. To quote from Pemberton, "The cervical canal is covered by a single layer of high columnar epithelium and is lined by microscopic racemose glands having a similar epithelium. The germs lie on and between these cells and in the ducts of the glands, but ordinarily do not attack the racemose parts. They may invade the outer parts of the submucosa. In the chronic stage the germ is found in clusters between the epithelial cells along the cervical canal and just inside the ducts of the glands. The mucosa of the cervical canal is thrown up in longitudinal folds which offer protection to the bacteria against drugs as the ducts of the glands are microscopic so that the drugs do not enter them."

The nature of our work has been to make electrocoagulation applicable to the neglected cases of specific endocervicitis and those intractable to drug therapy. Some of the cases have been in young women referred from the house of correction who have had heroic local therapy such as the application of crystals of argyrol and mercurochrome to the os, topical application of tincture of iodine and strong solution of silver nitrate together with customary douches and antiseptic tampons. The periods of infection, as near as it is possible to calculate from the histories, have extended over periods of weeks to months. No attempt has been made to apply electrocoagulation to acute specific cases, for it is generally conceded that serious complications may follow the application of those methods which are effective for the chronic infectious processes if applied during the acute stage. We have consequently limited surgical diathermy to the late subacute stages and the chronic stage of the disease.

Diagnosis: The difficulty in obtaining positive smears from chronic cases of gonorrhea is well appreciated. In spite of repeated examinations of cervical secretions immediately following the cessation of the

menses, failure is encountered in no small number. Provocative treatment with 20 per cent silver nitrate has been our choice. In the early part of our use of electrocoagulation it was observed that a number of cases who had a positive history and a history of recently transmitting an infection gave negative gram stains and did not become positive following the customary provocative treatment. Following a mild treatment of the cervix with surgical diathermy, we were surprised to obtain smears containing numbers of gonococci. Smears were taken from the seventh to tenth day following fulguration, at which time there is considerable secretion of mucous and a slight slough from the point of contact of the active electrode. As soon as the diagnosis has been verified the cervical mucosa is subjected to a thorough electrocoagulation.

Treatment: No anesthesia is necessary and in the majority of cases it is not necessary to pull the cervix down with forceps. The cervical canal is dried with cotton swabs, and four points, an equal distance apart, are selected for commencement of electrocoagulation. The needle is passed in the cervical canal for a distance of one to one and one-half cm., depending upon the length of the cervical canal and the degree of cervical hyperplasia and eversion.

Commencing then with the cervical canal, the active electrode is gradually withdrawn, the tissue being thoroughly fulgurated, as evidenced by blanching and sizzling at the point of contact. The whole process is completed in this manner. If the cervical lips are unusually large with erosion it may be necessary to fulgurate the surface with a flat type of electrode.

The fulguration does not produce any discomfort afterwards. Patients are instructed to use a plain hot water douche twice a day. In from a week to two weeks a slough of the mucosa occurs, leaving a clean base. Smears at this time are negative for the gonococcus if the fulguration has been sufficiently intensive.

Should the cervical smear at this time contain gonococci, crystals of argyrol and mercurochrome used on alternate days are inserted into the os and a tampon containing five per cent mercurochrome or 20 per cent argyrol placed in the vagina. The drug therapy is carried on from four to ten days, depending upon the appearance of the cervix. If the sloughing of the mucosa is complete, diathermy is repeated. We have never had occasion to use over three applications of surgical diathermy to produce an objective cure. We feel that the cervix is rid of gonococci as judged from the repeated negative smears over a period of some months, although we are aware of the unreliability of this as a criterion of cure.

Prognosis: In 18 cases treated in the manner we have not observed any complications nor seen any relapses. While this is manifestly a small group of cases, the results have been so uniformly good that we feel justified in urging electrocoagulation in the treatment of chronic endocervicitis, both specific and nonspecific. It is of particular value in the chronic specific

type which is apparently not amenable to chemical therapy.

EVERSION

Prolapse, puckering and erosion of the urethral mucosa is a rather common occurrence in the elderly multiparae. This eversion of the urethral mucosa is in reality a prolapse and, when complete, occurs with a ring of redundant mucosa surrounding the orifice. When it becomes edematous, the lips pout and, in severe cases, may undergo ulceration and necrosis. This condition must be differentiated from a true caruncle, which is distinctly a new growth. Prolapse of the urethral mucosa is a definite clinical entity and may give rise to distressing abnormalities of micturition. They rarely bleed, but may become exquisitely tender.

Treatment: Surgical procedures applied to the urethral meatus are far from satisfactory. Excision of the collar of prolapsed mucosa with suture of the cut edges has been the accepted treatment and, except in the hands of the very experienced surgeon, has been fraught with even more distressing complications. Surgical diathermy, if properly carried out, is devoid of complications. Infections and strictures do not follow and atrophy of the mucosa quickly occurs. Economic factors frequently must be considered in this class of patients. No hospitalization is necessary; the procedure can be quickly and painlessly carried out in the office, and no distressing symptoms result.

Our technique has briefly been as follows: In dispensary practice, we prefer sacral anesthesia to infiltration of the paraurethral structures with novocaine. On one occasion we used nitrous oxide gas. It does not then become necessary to use cocaine on the urethral mucosa and the structures are not distorted as occurs with the infiltration method. Four areas are selected, one above, one below and one on either side of the most dependent portion. Bipolar current is the method of choice. The inactive tin electrode, which has been thoroughly soaped, is placed next to the skin over the pubis or underneath the buttocks. A firm contact is essential. The needle electrode used is that recommended by Corbus and O'Connor. The surface of the mucosa is dried with cotton swabs. Coagulation is begun, using a current of about 500 ma. or less, and the four areas described above fulgurated until the tissue is blanched over an area of about four mm. and sizzling begins. The whole process takes but a few minutes. Sloughing is usually complete within two weeks and another week to ten days is allowed before any attempt is made to remove any redundant tissue that was not coagulated at the first sitting. We have never found it necessary to carry out more than two fulgurations.

CARUNCLE

Of the new growths in the urethral meatus of the female, caruncle is by far the most common and probably no condition has been subject to such a varied form of treatment. Chemical cauterization, surgical resection, and radium have had their trial and, while no form of treatment has reached perfection in the destruction of this very per-

sistent new growth, electrocoagulation or fulguration is more certain, less mutilating, freer from hemorrhage, and more easily carried out than any of the aforementioned. Recurrence is much less apt to occur.

Symptomatology: The chain of symptoms both local and general which these annoying growths produce are numerous. They are frequently exquisitely tender to touch, bleed easily, give rise to urgency and frequency and to painful micturition. The nervous symptoms which follow are proportional to the local distress and these patients usually wander from place to place in search of relief. Surgical diathermy places at our disposal a simple, safe and relatively sure form of treatment and, if properly carried out, affords relief to a heretofore neglected group of sufferers. The frequency with which this disorder is encountered and the simplicity of the treatment with the excellent results warrants the popularization of this form of therapy.

Treatment: The technique which we have employed is as follows: Sacral anesthesia is the anesthesia of choice, although nitrous oxide and paraurethral infiltration give very satisfactory results. The inactive electrode is placed over the pubis or underneath the buttocks as described in the treatment of prolapse of the urethral mucosa. Adequate exposure of the meatus is obtained. The surface of the caruncle is dried by gently swabbing with a cotton tipped applicator. Electrocoagulation is accomplished by inserting the needle in the base, changing the insertion as the tissue becomes coagulated. In this manner the root of the growth is effectively destroyed. The patients are instructed to apply daily an ointment, containing belladonna and some of the aromatic volatile oils. This seems to relieve the soreness which occasionally follows and hastens the slough which occurs in about two weeks. Complete relief from subjective symptoms occurs in from three to four weeks.

CONCLUSION

The consideration of the application of surgical diathermy has been limited to the treatment of specific and nonspecific endocervicitis, eversion of the urethral mucosa and caruncle, as these conditions are rather commonly met with and are amenable to treatment by the general practitioner.

Reference—Treatment of Gonorrhea in Women—Frank A. Pemberton, Boston Medical and Surgical Journal, Vol. 193, No. 9. August 27, 1925, pages 415-418.

DISCUSSION

DR. J. U. GIESY (Salt Lake City): It might be of interest to some to point out how I came to use surgical diathermy in endocervicitis. I did it purely accidentally. I was using a metal electrode for the purpose of giving a diathermy treatment, but I intended medical rather than surgical use of it. Evidently I gave more heat than the individual patient's tissue was warranted to stand. The result was that I got a beautiful superficial sloughing, and I accomplished a very pretty cure of the condition I was trying to treat by medical diathermy. I decided the result was so good in that particular case that it might be as good in [illegible] other case. I used a slightly different tec[illegible]que. Using a surface coagulation, a small copper wire was applied not much larger than a needle. Otherwise I followed out the doctor's technique very similarly except that I went into the cervix, and by insertion and retraction of this

needle over the mucous surfaces I aimed to bring about a superficial coagulation. My results seemed to indicate that I was along the right track. I have since followed out that method in gonorrheal infections. I think there is no doubt that in diathermy we have the best means of attack in these old chronic cases that will not clear up under medical treatment.

There is no germicidal influence which we possess today which is as strong as that of heat. If we destroy the infected tissue we certainly should be able to accomplish our object, provided our technique is within the limits of safety. I personally believe and feel sure that we do.

Dr. A. F. Tyler (Omaha): I should like to ask Dr. Hager what his experience has been in the treatment of urethral caruncle which extended up into the urethral canal, not projecting very much on the outside, but if you open the urethra with an instrument you can see it following along the wall of the urethra.

Dr. B. C. Corbus (Chicago): I should like, first, to correct one thing, and that is our nomenclature in regard to the application of diathermy. The word "fulguration" has been handed down to us from the beginning. Bier used it when he first began to coagulate tumors in the bladder, and we have a hard time getting away from it.

Fulguration means carbonization, and when you carbonize tissue you get very little heat penetration and you get very little effect by means of your carbonization. In using diathermy your current will not pass through carbonized area. I think that we should be very cautious in regard to the application of surgical diathermy to the endocervix. Few of us realize that the scar that is produced by diathermy is perhaps as intense and severe a scar tissue as can be formed.

I have not tried surgical diathermy in the form that Dr. Hager has, because we have limited our treatments of endocervical diseases to those in which we can specifically find a gonococcus. I have no doubt that diathermy applied in the endocervix acts similarly to radium, but I must say we must be extremely careful in the application of surgical diathermy to the endocervix lest we do more harm than good.

Recently I had a letter from a man asking if it would do any harm for the electrode to go up to 125 degrees and how long he could do it. We never permit ours to go higher than 117 degrees. We realize that immediately beneath the cervical thermophore the tissues are hotter than the thermophore registers, and we are getting a heat that is really higher than our thermometer reading.

We are hearing reports of the use of diathermy in the form that the doctor has used, and in the form that we have applied for specific gonorrheal endocervicitis, and some of the reports are derogatory and some are praiseworthy. In using any of these instruments, especially medical diathermy, we want to be sure that we have a machine that delivers us not voltage but amperage.

One of the complaints that I have heard with regard to the application of the thermophore to the cervix is that the patient cannot stand the pain. If the thermophore is pushed well into the endocervix and care is taken that the thermophore fits into the endocervix and the current is carried on gradually, as a rule patients can stand a temperature without any symptoms being caused.

I want to congratulate the doctor upon his efforts in using diathermy, because in heat we have the greatest medium there is.

Dr. T. Van Boyd (East St. Louis, Ill.): May I ask if after using diathermy on the endocervicitis cases there is a menstrual disturbance at the next period, or whether they have a bogginess of the uterus afterwards as a result of the diathermy?

Dr. A. A. Willmoth (Louisville, Ky.): I was very much interested in the paper that the essayist read and his work with coagulation of the cervix. I never have gone to that extent in

the treatment of the endocervicitis, that is at least for a number of years. Most of us perhaps are familiar with the beginning of this work with the actual cautery by Dr. Hunner, in which four incisions were made in the cervix, beginning at the internal os and drawing the knife down for the simple endocervicitis cases—not gonorrheal, or if they were, the old gonorrheal type, at least the ones in which the discharge could not be cleared up. After these incisions had healed, others were made between these: in other words, a complete scar tissue of the cervix resulted.

We are all familiar with what happened. We had scar tissue preceding a great deal of trouble. The result was that the treatment became abandoned, and justly so.

I am rather inclined to think that if the doctor will follow up his cases over a period of time he will find a great deal of trouble in these patients with the scar that is left in an electrocoagulation of the cervical structures.

My treatment with diathermy in these cases has been the simple heating of the tissues with the thermophore, not to the point of destruction. I do not see any real need, really, of such a destructive process here, and I believe you can get just as good results with the continued treatment of heating the tissues, giving them time to get the heat that you want, as you will with the more destructive process, and you will not have the resulting scar tissue.

I should like very much to have the doctor, at some future time, either write me personally or read a paper and report further on some of these cases that have gone through childbirth, and see what the result is on the cervix that has this tough, hard scar referred to by one of the speakers. I will be surprised if he does not find that there will be a degeneration of the tissues with more or less trouble following that would not follow the simpler method of the diathermy.

Dr. J. C. Elsom (Madison, Wis.): I should like to ask Dr. Corbus about the treatment of the cervix. He said he used this particular treatment only where a gonorrheal infection was found. I should like to know about these innumerable cases that we know have been gonorrheal in the past and are still gonorrheal in the tubes but only a certain percentage of the cocci can be recognized in the cervix. What is he going to do with those?

I also should like to ask the speaker about these cases of gonorrheal cervicitis where there is an infection of the tubes. What would you do with this surgical diathermy for the tubular infection?

Dr. Gustave Kolischer (Chicago): Diathermy in gynecology, especially gonorrheal infections, can be very easily guided by the experience of former years. Thirty years ago we introduced live steam into the uterine cavity; we did not cure the gonorrhea, but in many cases we produced a hematoma because we destroyed the mucosa of the cervix to such an extent that the cervix was obstructed. Later research work has proved that if you attempt to cure gonorrhea you destroy the superficial mucosa. The seat of the trouble is in the lower glands, in the deep glands within the cervix,and mainly within the uterine mucosa. Just imagine any one trying to cure gonorrhea of the uterus by destroying the surface of the mucosa. It cannot be done and it is not done.

We know that any attempt to destroy or injure the mucosa of the cervix or of the uterine cavity is a gynecological misdemeanor. The mucosa is very important for producing mucus. We know from other experiences, for instance hysterectomy, how the patient suffers from the keratosis of the mucosa because the lubrication coming from the uterine cavity is lacking. It is not only a clinical misdemeanor, it is absolutely against all the facts that we really know about gonorrhea of the female organs.

As to the gonococci that enter the tubes and the peritoneum around the tubes, diathermy, the heating of the tissues within physiologic limits, is one of the best cures of infection that we know anything about. All we do is produce an active hyperemia. Active hyperemia is the best cure for infection. It is the only cure that we know of. Nobody has succeeded yet in sterilizing the tissues, but in many instances we succeed in changing the soil. That is the real advantage of diathermy.

Nobody can convince me that it is possible to heat the tissues within the human body to such an extent as is necessary to kill the germs by heat without injuring the tissues.

We cure these cases in a great many instances where we failed before. Why? Because we produce an active hyperemia. We know how effective passive hyperemia is; and active hyperemia is much more effective. That is the secret of the effect of diathermy in gonorrheal infections.

You do not cure the gonorrhea but you injure the patient when you use the more drastic methods.

Dr. B. H. Hager (Madison, Wis.): I am very glad for the discussion that this paper brought out, for the simple reason that we are all interested in getting rid of these very resistant infections that we regard as endocervicitis and cervicitis.

I believe the success in the destruction of a caruncle is complete destruction of the whole base. That has to be carried out rather conservatively and carefully so as not to produce too much destruction of tissue, but sufficient to destroy the base of the caruncle.

In regard to Dr. Corbus' objections to fulguration, I realize that he is absolutely correct, that fulguration means carbonization of the surface through which the current does not pass, but it is a term that has crept into our nomenclature, and many of us regard fulguration as electrocoagulation.

Relative to the doctor's treatment of the infections of the tube following the involvement of the cervix, we make no effort to use surgical diathermy in the case of a specific salpingitis. I think the success in the treatment of endocervicitis depends upon the degree of fulguration. I do not mean to carry the fulguration to the extent that you would in radical destruction of malignancy of the cervix. This has to be guided by experience, and it is extremely difficult to tell any one to what degree to destroy the cervical glands, the cervical tissues, by the application of electrocoagulation. We do get clinical results. I do not believe we destroy any more than the cervical hyperplasia of the cervical glands. I question very much whether we go beyond the submucosa of this surface.

I was very much interested in what Dr. Kolischer had to say.

A MEDICAL CARBON-ARC LIGHT LAMP ON NEW PRINCIPLES*

Dr. A. Stein,
Wiesbaden, Germany.

THE importance of heliotherapy with artificial light is daily more and more evident. Light treatment has won its way to general recognition and ever extending use in modern therapeutics since the days when Finsen first introduced the carbon-arc lamp that bears his name.

Since Finsen's time the heliotherapy known to the ancients, that is, the powerful rays of natural sunlight, has been increasingly used, but we now have greatly improved apparatus for the production of artificial sunlight. Bernard of St. Moritz and Rollier of Leysin both have done much to direct the modern light treatment with solar rays into a practical system, and have worked out their results on an exact and scientific basis. The results obtained so far, with the natural solar radiations as directed by these two Swiss practitioners, have given such good encouragement that we, desirous of continuing the radiation treatment for our patients, are glad to have been able to find an artificial lighting that can and does effectively replace the natural sunshine in dull weather on dark winter days. As it is usually almost impossible to expose patients to sun-baths in towns and cities, artificial rays can be utilized daily to advantage.

Finsen's earlier form of apparatus, which he had designed for the treatment of lupus, was of little use except for the treatment of small local lesions; not only was it complicated in construction and in use, but it could not be adapted for general radiation of the body.

The sort of lamps that came next into use for medical purposes and which found a rapid and extensive adoption as sources of light for heliotherapy were the quartz lamps. Their radiations are produced by the electro-vaporization of mercury in a tube of pure quartz. That the rays emitted are therapeutically very active is not for a moment to be disputed. This powerful action is attributed to the richness in ultra violet rays of the spectrum.

Relying upon the statements and certain observations of Finsen, it was thought, until very recently, that the only active therapeutic agent in heliotherapy was the ultra violet rays; and therefore that a lamp that emitted practically no others must be therapeutically the best.

But the careful experiments and observations of a large number of modern practitioners have led us to the conclusion that not only the ultra violet rays, but also some of the others and especially the infra red, have proved to be most effective as therapeutic agents. And this conclusion has only been arrived at by the consideration that the natural sun, whose healing rays can never be surpassed by any others, is not by any means exclusively an emitter of

*Read at the International Congress of Radiology in London, July, 1925.

ultra violet rays, but that these rays are of quite secondary importance to us, for it is the other colors of the spectrum that constitute the great mass of sunlight.

When it was proved that such was the case the next task was to find new sources of artificial light to resemble the natural sunlight to the greatest degree. Recourse was then had to the old-fashioned arc light: for there cannot be the slightest doubt that the arc of light produced by the passage of the electric current between two carbon points is far more similar to natural sunlight than that produced by the quartz lamps, known in Germany as the "kunstliche Hohensonne," or artificial Alpino sunlight. For it is scarcely possible to produce a light that is less like natural sunlight than that of the mercury-vapor quartz lamp.

This is the object of my present demonstration.

If we are desirous of employing the carbon arc lamp as the source of our heliotherapeutic radiations, on the basis of our experience we must endeavor to:

Firstly: So build or arrange the lamp that the rays emitted by it shall resemble as nearly as possible in their spectral composition those of the sun. This has been done experimentally by mixing certain metallic salts in the composition of which the carbon points are moulded. It has been found possible to approach the natural sunlight to a remarkable degree. But so far we are still only at the experimental stage —and an imitation of the sunlight that shall represent the original in absolutely every particular seems to be an almost unattainable achievement.

Secondly: We must do everything in our power to render the greatest possible percentage of the total energy set free by the burning of the arc between the carbon points available for our heliotherapeutic needs, as a source of healing force and power, without in any way regarding what its actual composition may be, considered purely as a mixture of rays from different sections of the solar spectrum.

In the lamp which I should like to show you today the first requirement, that of the most favorable spectral composition of the

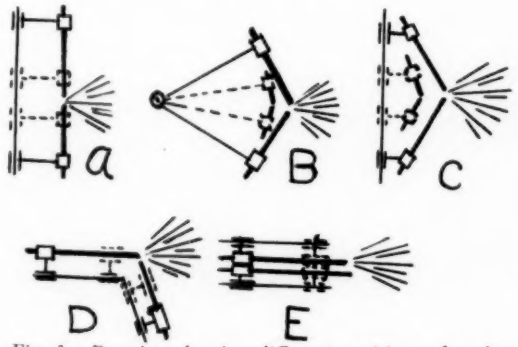

Fig. 1.—Drawing showing different positions of carbons.

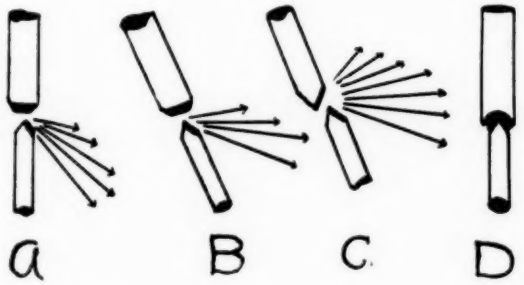

Fig. 2.—Drawing showing disadvantages of carbons placed in the usual positions.

carbons, has so far been successfully fulfilled by many experiments, as our present-day knowledge of chemistry permits in its application to the question of the manufacture of these carbons. I shall have the pleasure of showing you presently a photographic representation of the spectrum of the new arc lamp.

The second requirement, that of the greatest possible utilization of the radiant energy, has been satisfactorily solved by placing the two carbon points in such manner that has until now never been employed for such radiations in heliotherapy—that is to say, in parallel. The idea itself of placing the two carbons side by side and parallel is not new.

I think I am correct in stating that as long ago as 1876 a Russian named Yablokoff mentioned this system. About thirty years ago such lamps were used for a short time in France for street lighting. These lamps were then lost sight of completely and only brought up again in 1910 by a Dutch engineer named Halbertsma, who used this parallel arrangement for the construction of a projection lamp.

First of all I would like to show you by means of illustrations the great advantages of the parallel position of the two carbons (Figure 1). In this picture we see in *a* the carbon rods perpendicular one above the other; in *b* and *c* they lie at varying angles, in *d* one is horizontal, while the other is at an obtuse angle. In *e*, however, they are parallel to each other.

By looking closely into this diagram we cannot fail to observe that the greatest unobstructed radiation must naturally and surely proceed from the parallel arrangement of the carbons in *e*. The sketch shows clearly that no part of the arc is shaded by any part of the other carbon.

On the other hand, the whole of the radiations are free to stream out on the object before the arc lamp unhindered. In Figure 2 the drawbacks of most of the other positions of the carbons that are usually employed are distinctly shown. In *a* the principal radiation of the positive pole, at

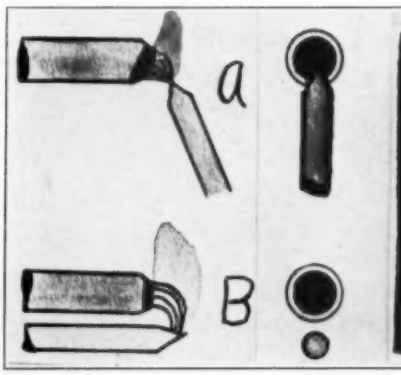

Fig. 3.—Drawing showing carbons set at angle and parallel.

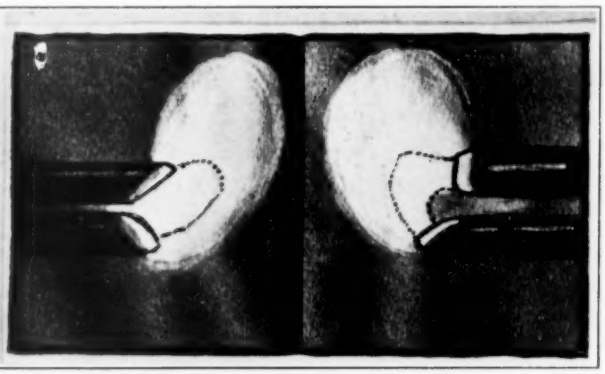

Fig. 4.—Drawing showing on left parallel carbons excited by alternating current and on right those excited by continuous current.

which, as is well known, the light-crater forms, is thus directed downwards. If the carbons are directed a trifle sloping the radiation goes somewhere more to the front, *b*. If we then place the negative carbon, as is often done, a little in front of the positive one, *c*, the utilization of the effective radiation is immediately better. But it soon gives way again, because the point of the negative carbon gradually creeps in front of the crater, *d*, and in so doing it causes a shadow. The conditions in Figure 3 are, however, much more favorable when the positive carbon is horizontal and the negative one in front at an angle, *a;* but still there is a certain amount of shadow inevitable through the position of the crater of the positive carbon. But when the carbons are placed strictly parallel as in our lamp, *b*, all trace of shadow disappears. The formation of the arc itself is still better seen in our Figure 4, which is sketched from photographs. In the left-hand photo we see the arc that is produced by the alternating current in which the carbons burn away equally both above and below; while in the right-hand photo, which shows the result of the continuous current, the crater may be seen on the positive carbon point. You thus see how both the arc light and the carbon crater can be fully utilized.

A mutual shadowing of the carbon points never occurs, so that we can call it a 100 per cent light.

In the next diagram that is for the usual position of the carbons taken from the "Electrical World," we see a chart showing the comparative intensity of the arc light proceeding from parallel and angular carbons respectively. On this chart, Fig. 5, the vertical column of figures represents the Hefner scale of candle power, and the horizontal line of figures the number of amperes in the current used. This chart refers to continuous current, and it can be seen that

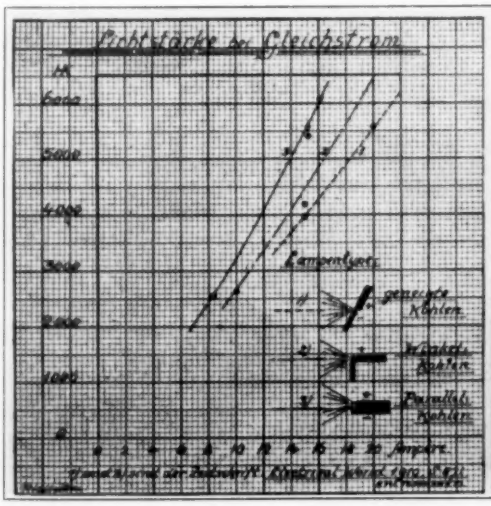

Fig. 5.—Chart showing comparative intensity of light from parallel carbons and carbons set at an angle.

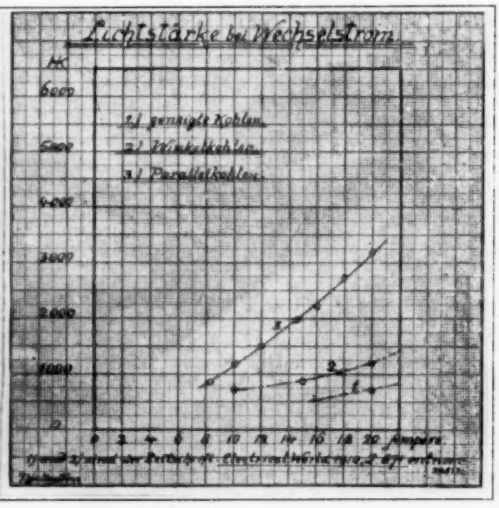

Fig. 6.—Chart showing comparative results produced by alternating and direct current.

with 15 amperes, for instance, the candle power obtained with perpendicular carbons is 4,000; with carbons at right angles, 4,500, and from parallel carbons 5,500 cp., respectively.

In the next chart (Fig. 6) the results with the alternating current are shown to be similar. Here, of course, the high candle power of the continuous current is not to be expected, but we see very well the experimental differences.

The alternating current with 15 amperes yielded, with sloped carbons, 500 candle power; with angularly placed carbons, 800 cp., and with parallel carbons, 2,100 cp.

I will now show you the spectrum of the carbon that we use for our lamps. In the upper part of this diagram (Fig. 7) you see a scale of wave lengths. Beneath this scale at *a* there is the photograph of a spectrum of the quartz lamp; *b* is the spectrum of the new radiation lamp with ordinary carbons with four seconds exposure; *c* is the same spectrum with two seconds exposure, *d* that of the special ultra carbon arc lamp with three seconds exposure, and *e* the absorption spectrum of a glass light filter.

From this you will readily observe that up to something like 330 mu expressed continuous spectrum is evident, which, originating principally from the carbon craters, is charged with numerous spectral lines. Below the 330 mu border there is a pure line spectrum to be seen; in the plain carbons this extends to 220 mu, but with the "ultra" carbons below 217 mu. The radiations of these special lamps are therefore as a consequence of the special composition of the carbons, very rich in short-waved rays in the ultra violet region of the spectrum. Meanwhile, if it be so desired, these short-waved rays can be filtered out, in order to exclude all rays that lie lower than 290 mu. (That is the limit of the natural solar rays.)

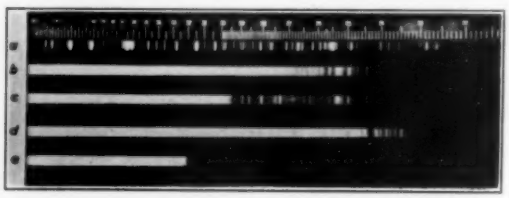

Fig. 7.—Spectra of various forms of lamps.

Although this new lamp, that has been named the "Jupiter lamp," is extraordinarily rich in ultra violet rays, its principal efficiency in radiation lies in the infra red portion of the spectrum. This property is inherent to all arc lamps. I am here showing you the proportions of the energies of the various rays that are usual in the light of the sun and of the electric arc.

The portions colored yellow represent the radiant energy in the visible field of the spectrum; the red portion the units of energy in the infra red region, and the blue colored portion those which are transferred from the ultra violet end.

You will notice on the various lines of the graph the temperatures reached are noted (in degrees centigrade), and you will notice that the lower temperature of the radiating substance, the greater the percentage of infra red as compared with the visible and the ultra violet rays.

The upper and outer line is the curve of the Jupiter light. With its temperature of

4,200° C., it is some 1,800° less than that of the sun, which is 6,000° centigrade; but in respect to the distribution of energy it approaches very nearly to that of the sun itself. A glance at this graph is quite enough to show us what an infinitesimal proportion of the total radiant energy is really represented by the ultra violet radiations.

Now, because the practical, successful results obtained with the different forms of radiant heat lamps since Finsen's days are undoubted, and because the sun itself is the simplest of all sources of radiant heat and energy, we may therefore state once for all that in no case can the ultra violet radiation be regarded as the sole decisive factor in successful heliotherapy. That the ultra violet rays have a decidedly inflammatory effect is not disputed. But whether this inflammation of the skin is necessary or desirable as a means to an end in heliotherapy is not by any means proved and not at all certain, although many writers, especially the radical supporters of the quartz lamp, stoutly maintain that it is so.

And very probably, also, the pigmentation does not play so important a part as has been ascribed to it from many different quarters. On account of the practical good results obtained already with pure radiant heat rays and especially with the arc lamp, this view cannot be further upheld. Besides which we may observe that when the composition of the arc lamp carbons is chemically modified, it is quite possible to make its light excite both pigmentation and inflammation of the skin, if so desired. All that has to be done to produce this effect is to shorten the distance between patient and lamp and lengthen the time of exposure. But the great advantage of these lamps is that one can avoid all erythema, if so desired, as is the case with the great majority of the patients who come to us for treatment.

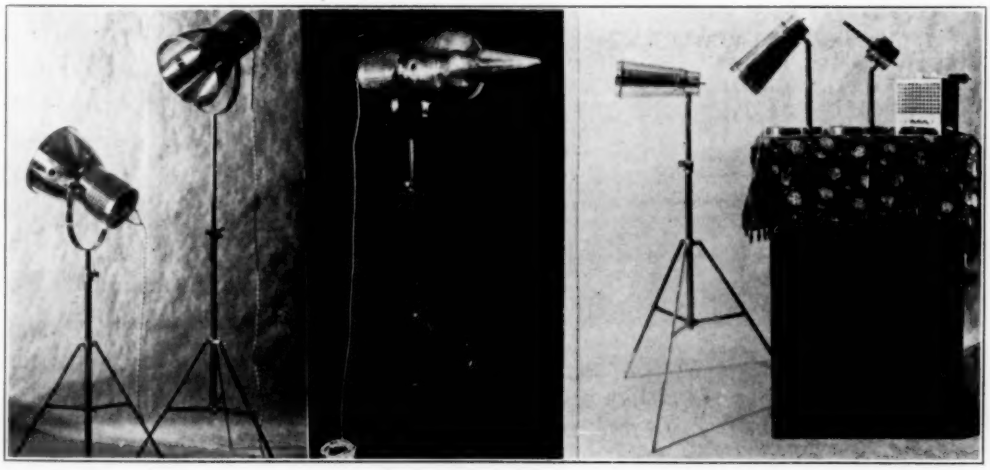

Fig. 8.—Parallel carbon arc lamp No. 30. Fig. 9.—Same lamp with adapter. Fig. 10.—Type 34.

Especially is it advisable to avoid all burns of the mucosa with the ultra violet rays, which are always most liable to excite acute inflammation. For this reason the quartz lamps, with their too high percentage of ultra violet radiations, are highly unsuitable for use on the mucosa, while with the radiant heat lamps, such as our arc lamps, heliotherapy of the mucosa can be carried out without the slightest discomfort or danger.

This fact alone widens the field of heliotherapy enormously, for it admits countless cases to the treatment, which would otherwise have to be rigorously excluded.

To refer in detail to the biological side of the question would take up too much of your valuable time, but you know that many different theories have been advanced to account for the beneficent action of the rays of light in the treatment of disease, unfortunately, however, without our being able to say with certainty which is the correct explanation of the phenomenon.

We must leave it to the future to decide whether the most important factor in the undeniable and powerful effect is the biological influence of light on the composition and circulation of the blood, and whether this is effected with or without intervention of the pigmentation, or whether, as has been recently advanced, the nervous system, in particular the sympathetic reacting on certain endocrine glands does it; or finally, if it is merely the effect of the warmth, i. e., the hyperemia, which produces important changes.

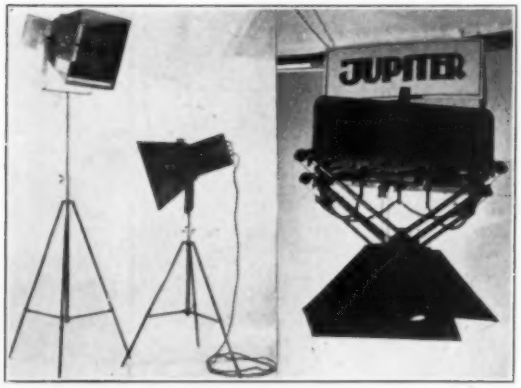

Fig. 11.—Type 26 mounted on tripod.
Fig. 12.—Type 27 mounted on ceiling.

I will now show you the lamps, with parallel position of the carbons (Fig. 8). There are various models of these lamps made. I am showing you first the most important of them, the so-called No. 30 floor lamp (Standerlampe). It has two pairs of parallel carbons and thus has a double arc. Both the pairs of carbons are placed within a hemispherical reflector of aluminum. This is left open in front when general radiation is required, and partly closed with a funnel-shaped adapter for small local radiations (Fig. 9), with the reduced and concentrated stream of light rays that can be applied in this form to the smallest local lesions. This adapter is especially useful in treating affections of the mucosa, *e. g.*, mouth, throat, teeth, ear, vagina, etc., as well as small spots on the skin. This lamp works with 10 amperes and gives a light of 6,000 cp. The resistance necessary for the satisfactory working of the lamp is in a little case fitted at the back of the reflector. Here, also, is the connection for the current, which is so arranged that this lamp possesses the great advantage of being adaptable for any voltage, *i. e.*, for 110, 120 or 220 volts and either for continuous or alter-

nating current. It requires no alteration whatever, merely placing the contact in one or the other position and the lamp is ready for use with either voltage or current.

Besides this floor model of the Jupiter lamp, there is a smaller one, called the Jupiter 34, known also as the "Heilsonne" or "healing sunshine lamp" (Fig. 10). This little model can be used either on a small table-stand or fixed to the floor-tripod, as required. Unlike the No. 30, it has only one pair of carbons, *i. e.*, single arc instead of double, and in order to make the lamp lighter to handle, the rheostat is in a separate little case. It works with six amperes, can be attached to any house wiring and yields a light of 3,000 candle power. Like the larger one, it can be used without any further alteration for both kinds of current and any voltage.

We also have a big model for general radiation of groups of patients at a time. This is called the model No. 26, and is shown in Fig. 11. Of course this is of heavier build and the two pairs of carbons of thicker diameter. It works with 25 amperes and yields 15,000 cp. I show you here the inside of the lamp. You see the two pairs of parallel carbons and a protective net to prevent that small particles of carbon flying off may hurt the patient. In spite of everything possible having been taken into consideration in the composition of the carbons in order to avoid the formation of all smoke, it happens that smoke is formed occasionally. But this is so slight as to be entirely negligible in the smaller lamps, and is not troublesome even with the larger floor lamps.

With the very large ceiling lamps (Fig. 12) that require no less than 60 amperes, a suitable ventilator must be fixed. A somewhat surprising fact has been discovered in connection with the unavoidable smoke formation in these arc lamps, and that is that the gases emitted with this smoke have a certain therapeutic value of their own, especially in cases of high blood pressure. This question is now being studied.

The removal of the used carbons and placing of new ones is easily and quickly done, a few seconds sufficing. The arc lights up instantaneously as soon as the contact is on. The carbons do not have to be regulated at all during the burning. It goes on automatically till there is not a trace of the carbon left; but in order to avoid ruining the metal parts of the lamp there is a safety device attached to the burner which puts it out as soon as the carbons have burned low enough. Through two little ruby windows it is easy to see how they are burning down.

			Carbons		
Types	Amp.	C.P.	Pairs	Burns Min.	Intensity
34	6	3,500	1	70-90	0.38
30	10	6,000	2	70-90	1.2
26	25	15,000	2	90-100	3.0
27	60	40,000	3	360	11.0

Fig. 13. Comparative record of the four types of lamp.

Figure 13 shows a comparative record of the four types of lamps we have just been dealing with. In this table the amperage, the number of pairs of carbons, candle power, length of time the carbons may burn and light intensity expressed in candle power are all shown. From this table you can see that these lamps burn from one and one-quarter, one and one-half to

one and three-quarter hours respectively, according to size.

Besides the model Nos. 34, 30 and 26, model 27 is shown. This big size takes 60 amperes to work it, has three pairs of carbons, lasts six hours and gives 40,000 candle power light all the time. This is fixed to ceilings in the larger city hospitals, sanatoriums and radiant heat institutes (Fig. 12).

Owing to special technical considerations necessary in the manufacture and working of this great lamp, it has been found expedient not to build the carbons in strictly parallel series, but to place positive and negative carbons at an obtuse angle and to approach the pairs in such manner as to effect a crossing of the arcs. This system gives the best possible results as to effective radiation and intensity, with best utilization of the total rays.

The results so far obtained with the Jupiter lamps are absolutely splendid in every possible respect. These lamps have been made and introduced at my suggestion, after the experiments that I had made at first purely from a photographic interest. They have been tried out by a large number of German physicians and adopted by them for permanent use, the results having been so good.

The indications for the employment of these lamps are identical with those for other systems of light treatment. It is unnecessary for me to quote further details in this connection. I feel quite sure that if you give either of the types of lamp that I have described a trial, you will soon have such good results that you will be thoroughly satisfied.

We have been dealing with a system of arc lamps for medical radiation, in which the carbons are placed in parallel series. The arc light is then formed between the two carbon points which lie one above the other. This position of the carbons enables the light rays to stream out without any shadowing of the light crater, which is more or less the case in every other form of carbon lamp. The Jupiter lamp is fitted with carbons of a special chemical composition. The result is that these lamps produce numerous ultra violet rays down to 217, as well as notable proportions of infra red and heat rays.

The spectral values of the light produced by the arc approaches more nearly that of the natural solar rays than any other lamp made. The technical execution of the lamp is such that it may be attached to any wiring, any kind of current and any voltage. The manipulation of the lamp and the changing of the carbons is simplicity itself.

So far four different sizes and types of these lamps have been placed on the market with from one to three pairs of carbons, and ranging from 6 to 60 amperes current requirement. In the largest form of lamp the parallel position of the carbons is replaced by obtuse-angular arrangement for pure technical reasons.

The cures effected by the use of these lamps are remarkable and important.

THE ELECTRICAL ASPECTS OF ENDOTHERMY, WITH SOME SURGICAL OBSERVATIONS*

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THE surgical procedure called "Endothermy" is urged by its advocates as being the method of choice to employ in the removal of superficial tumors and the treatment of chronic skin diseases. The modality consists of an electric machine which supplies high frequency currents for the purpose of either cutting or coagulating tissue with electric sparks.

Electricity has always been used in some form or other to combat ailments which have baffled the clinicians. A general belief has existed since its discovery that it possesses mysterious healing power. The miraculous results of x ray therapy increased the popular regard for electricity as a panacea. This background served as a fertile field for the promotion of endothermy on the basis that the public likes a mysterious remedy if there is any virtue in it.

The chief exponents of endothermy in America have defined it as "The localized production of heat in the tissues from within in response to the oscillations of a high frequency current" (Wyeth). This definition is misleading. The author must have had in mind only the etymology of the word endothermy. The heat involved does not originate from within the tissues, but is due to electric sparks. A peculiarity of a high frequency current is the facility with which it sparks through the air; in other words, ionizes gases. High frequency currents, as far as their action on the tissues is concerned, may be divided into two classes, the cutting and the coagulating. A historical sketch will reveal the significance of these two terms.

The first endotherm cutting machine was made in Germany in 1918 (Stoyer). The use of a high frequency current had heretofore been confined to the coagulation of tissues. Doctor Bier removed malign bladder tumors in 1910 with such a current. Doctor Clark was already treating skin diseases with a similar current. Until the invention of endothermy in Germany, however, the cutting feature of a high frequency current had not been discovered.

It is impossible to understand the difference between the cutting and coagulating currents without knowing what the term oscillation means. An oscillation is nothing more than a simple wave of electricity. High frequency oscillations are produced by the vibrations of a discharging condenser. If a condenser is allowed to fully discharge itself without interruption the waves gradually decrease in height just like the sound waves of a tuning fork. A series of such waves is said to be composed of simple oscillations. If a condenser should be made

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to discharge itself so rapidly, however, that a second set of vibrations commenced immediately after the first set began, and so on, a continuous series of waves would be created, all practically equal in height. A series of such waves is said to consist of undamped oscillations.

Simple oscillations are used for coagulating tissue, whereas "undamped" are used for cutting it. The "undamped" oscillations were first obtained in Germany by finding a proper balance between the capacity of the condenser and the inductance coils of the high frequency circuit. The high frequency circuit delivering these oscillations is an exact duplicate on a minor scale of a radio sending apparatus. Between the primary and the high frequency circuits there is a small secondary circuit where a transformer lifts the voltage to 1,100 volts. With this pressure maintained, it was found in the foreign machines that the condenser would supply a million oscillations per second, the number best suited in endothermy for both cutting and coagulating tissue. circuit with a radio bulb where cutting was desired. The argument was advanced that this was a better arrangement for getting undamped oscillations. It was thought for a time that the innovation improved the quality of the cutting, but the installment of bulbs involved the partioning of the machine into sections. It has been recently found, however, that just as good results can be gotten from the German idea, slightly modified. The bulky lamp model is, therefore, being discarded for a small, inexpensive, single case type modeled on the foreign make.

Several theories have been offered in explanation of the cutting phenomenon of a high frequency current. A plausible explanation is based on the chemical action of electricity. The current may separate the hydrogen and the oxygen of the water present and ionize these two gases. A reaction of this character could negotiate a pathway through the tissues. The foundation of another explanation is the lightning theory. When lightning strikes a tree, the sap conducts the electricity to the ground. A high frequency current may seek the lymph which bathes the cells. As lightning rips the bark from a tree without injuring the trunk, the current in endothermy could separate the tissues along a line of cleavage selected by the operator. The application of great heat is the basis of the final solution of the problem. The sudden expansion of the water present in the tissues into steam could account for the division of the flesh. None of these theories is satisfactory, because they omit the stellar role which undamped oscillations play in the procedure of cutting tissue.

The tissues which border on the incision sustain very little damage from the cutting. The delicate spark may sear the flesh, but no matter how hot it becomes, the spark does not primarily burn. Burning would do more damage and consume more energy than the machine could supply. In the operation of cutting, the current furnishes just the right quantity of heat to close most of the capillaries by coagulation. As a consequence, good endothermy should cause little hemorrhage.

An endotherm machine is provided with three electrodes, as superficial and deep coagulating require separate applicators. The superficial coagulating electrode is called by several names. Those commonly used are Oudin and monopolar or unipolar. The word "monopolar" will be used hereafter to designate this electrode, although it is an objectionable term. In common electrical parlance there is no such thing as a monopolar current. All currents are bipolar, otherwise electricity would not flow. The other pole in the case in question is the patient's body, from which the current returns to the machine by electromagnetic waves. The currents used for cutting and deep coagulating are both manifestly bipoiar. In addition to the applicator, an electrode must always be placed under the part treated in order to complete the circuit. These electrodes handled separately are absolutely impotent.

The pyrotechnics of the monopolar current are spectacular. With a voltage back-up of any consequence, sparks literally leap from the electrode into space and produce a brilliant display of light. If all the voltage obtainable is used, these flashes of electricity rival lightning for three inches about the monopolar electrode. This feature of endothermy alone is astonishing enough to awe the spectator. Notwithstanding this apparent demonstration of power, the machine is practically fool-proof. The monopolar current is not strong enough to do much harm. In its freakish behavior it sparks away the greater part of its energy in ionizing the air. The only point of danger in connection with the machine is inside the case where a transformer has raised the voltage to 1,100 volts. A shock from this current would prove uncomfortable. The danger is reduced to a minimum, however, because the region is well guarded.

The voltage of a current is measured roughly by the width of the gap which it will spark across. An initial allowance is always made of 10,000 volts for the first inch of gap. A current which will spark across an inch gap is said, therefore, to have a pressure back-up of 20,000 volts. If it will spark across two inches, it is called a 30,000 volt current, etc. High frequency currents, however, do not obey this rule; otherwise, the monopolar current would have a pressure back-up of 40,000 volts every time it flashed three inches into space. The pressure of a monopolar current at work rarely exceeds 1,000 volts, the deep coagulating 100 volts and the cutting current 200 volts. The size of the monopolar current is less than 30 milliamperes, the cutting 150 milliamperes and the deep coagulating 800 milliamperes. These figures are necessarily approximate. It is self-evident that more energy is needed to either coagulate or cut tough tissue than tender tissue. The energy of a current is the product of the amperage and voltage.

The fact that endotherm applicators remain cold throughout the operation is a much discussed but easily explained phenomenon. High frequency currents and static electricity are comparable. If static electricity is transferred to a ball, it is all

found on the cover and none in the interior. High frequency currents, therefore, flow along the surface of a conductor. A pointed instrument is usually used in endotherm operations. The fact that electricity will gather at a point is demonstrated in Franklin's lightning rod. Flowing along the surface of a conductor, a high frequency current is ready to escape into the air with the slightest pressure back-up upon reaching a point. Since the conductor offers no resistance, under these circumstances there is no reason for the applicator to ever get hot because roughly speaking the electric current glides along the surface.

The classical way to perform an operation with the endotherm method is first to coagulate the surrounding healthy tissue about the tumor with the deep coagulating needle. The part treated must, of course, be anesthetized in advance. The tumor itself should then be destroyed by coagulation and the mass removed with the cutting instrument as close as possible to the healthy tissue. The wall created by the initial coagulating procedure is supposed to prevent metastatic dissemination of viable cells. It takes more skill to do good coagulating than good cutting. If slight pressure is applied to the needle, it can be pushed into the flesh without much mechanical damage resulting. The reason for this is that coagulation precedes the progress of the needle point. Although the sparks surrounding the coagulating needle cannot be detected with the naked eye, the applicator is completely covered with a thin mantle of electricity which theoretically performs its work before the metal touches the flesh.

The claim is made that endothermy has the enormous advantage over ordinary surgery of destroying the malignancy before removing it (Wyeth). This is a sincere statement made in good faith. The pathologist is as much to blame for it as the author. The trouble is with the diagnosis. If a case is on the border line the pathologist often reports back a positive finding. This is why so many schemes have been honestly advocated as cancer exterminators. Nevertheless, the clinics are full of victims despite the succession of remedies.

Endothermy looks very well in theory, but it does not work out so well in practice. It is impossible to manage the electrodes without mechanically injuring the tissues. Although endothermy is a step forward, the goal of bloodless surgery is still remote. The hemorrhage which occurs after cutting may be fairly well controlled with the superficial coagulating applicator. The amount of bleeding is small as compared to ordinary surgery, but the working time is greater. These factors would offset each other if the endotherm method did not result in sterilizing the tissues as the procedure progresses. The electric spark is responsible for this all-important feature. The following is a list of the physical and chemical changes produced in the order of their importance:

(1) Heat.

(2) Nitrous fumes.

(3) Ozone.

(4) Violet and ultra violet rays.

(5) Ionization.

These are all germ killers and need no apology as sterilizers, with the exception of the last item.

Although it is the concensus of opinion of physiotherapists that malignant cancer cannot be cured by the endotherm method, there is a field for the use of the machine in minor surgery, particularly to attack stubboarn lesions the location of which contra-indicate the knife because of the cosmetic effect. In treating malignancy radium and x ray are the methods of choice. It was demonstrated long before the introduction of endothermy in medicine that certain skin lesions, for example, lupus vulgarus, respond to treatment by high frequency currents.

THE TREATMENT OF BURNS BY ACTINOTHERAPY*

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IN presenting this paper, it is not the intention of the writer to claim any originality in this method of treatment, but merely to show the effectiveness of light therapy in burns and its advantages over the old methods. If there ever was a treatment that should have been revised long ago, it is the treatment of burns.

Think of the patients who have been punished by the old method of applying solutions, ointments and dressings, only to have the physician tear off with his dressings day after day all the repair of nature, with the attendant nerve racking pain and discomfort!

The thing that appeals to me most in the treatment of burns by light therapy is that it comes so near to being just as nature would have it to be. Burns of all kinds heal kindly by light therapy, and a few facts are in order to show why this is true. Practically all burns are naturally sterile at the beginning, as the heat that destroys the tissue also sterilizes the tissue.

It is the duty of the physician to keep them sterile,—but how can this be done? The answer is light therapy. It is an established fact that infection of burns occur from pathogenic bacteria introduced from without, from adjacent unburned skin, clothing, dressings, air, etc.; so, to keep the adjacent normal skin and the affected areas sterile, we use the ultra violet light, which is the best germicide we have, and it is also the easiest to apply, as it is applied without pain, and without hand, instrument or dressing coming in contact with the affected sensitive areas.

How simple to allow the rays to shine upon the sensitive tissues and bathe them in the soothing germicidal light, as compared to the old method of antiseptic dressings. Ultra violet light sterilizes our burn again as it was in the beginning, but in a kinder way.

Let us consider the pathology in burns as given by Delafield and Prudden: "There is apt to be congestion of the brain and the

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thoracic and abdominal viscera. The lymph-nodes and the lymphatic tissues throughout the body may be swollen and the seat of endothelial cell proliferation and necrosis. There is usually albuminous degeneration of the liver and kidneys; the spleen is swollen, and the seat of focal necrosis. Focal necrosis in the bone marrow has been noted. There may be capillary thromboses, interstitial hemorrhages in the kidney, and leucocytosis. These lesions indicate the presence of toxic substances in the body fluids, and thus the general condition may be regarded as an instance of auto-intoxication. Secondary lesions are not infrequent; there may be ulceration of the duodenum and pyaemia."

What a field for light therapy! We apply light from the so-called deep therapy lamp, or the electric bath cabinet for its effect in relieving congestion of the deep organs, such as the liver, kidneys, spleen, etc., and to relieve blood and lymph stasis, and to increase elimination of toxins by increased functional activity of the normal skin, and to bring blood to the surface where it can absorb the actinic rays, while the mild heat dries the surface of the moist areas and prevents moist slough.

What could be more efficient than ultra violet light, which has the effect of penetrating the blood stream, invigorating the red corpuscles, which carry to the cellular elements of the body an increased amount of oxygen, and carry away the increased amount of toxins, raising tissue vitality, bodily resistance, and balancing metabolism?

With light therapy there are no dressings to remove, as my cases have all been treated by the open method, and the blood serum is allowed to bathe the injured tissue constantly beneath the formed, sterile scabs which serve as a protection to the sensitive parts from air, clothing, bed clothes, etc. The scabs are allowed to remain until the tissues beneath are healed and the scabs drop off of their own accord, when we find that the tissue beneath presents a normal appearance. And why not, when nature's protection has been allowed to remain, and the newly formed epithelium has not been torn away by repeated dressings, but bathed and soothed by nature's fluids until the patient, like a snake, sheds the old skin when nature has prepared the new skin beneath to take its place?

We give the same treatment daily; that is, radiant light and ultra violet, to the new born epithelium until it becomes tanned and toughened to withstand exposure to air and garments. In the cases I have had, I have seen hair on the skin to quite some length when the scabs dropped off, especially on the wrist and backs of the hands. It is not unusual to have scabs drop off like potato chips and in large numbers during a treatment, and to find perfect new epithelium beneath. One of the gratifying things about this method of treatment was that the patients suffered no pain, but rested and slept well from the start. The temperature remained normal in all cases except one, which went only to 101 for two days; all had normal kidney functions throughout the duration of treatment, and digestion, appe-

tite and bowels remained normal. There was no scarring nor contractures.

We all know that ultra violet keeps down scar tissue, and the cosmetic effect in burns is one of our first aims. A physician should not consider that he has done much for a patient who has his burn healed with disfiguring scar tissue and contractures, for they will do that without treatment; still, there are great numbers disfigured for life who have been treated by the old method.

Let us discard the old treatment and take up the new treatment of light therapy for the patient's sake, as well as our own. I have never had more grateful patients than those treated by this method.

I wish to present three case reports.

Case One: Mr. G. M., age 45, white, occupation laundry foreman, admitted to hospital Jan. 19th, 1925, with burns on back and arms.

Family History: Unimportant except father died with erysipelas.

Present Illness: Patient had some soft soap boiling in a large tank when it started to boil over on the floor. He ran to turn off the gas and slipped into the boiling soap, scalding his back from the waist to the neck and the posterior portion of both arms.

Physical Examination: Second degree burns on back and arms, except an area three inches in diameter on left arm about three inches above the elbow and an area two inches in diameter on right scapular region which are third degree burns. Treatment consisted of light penetration daily for one hour or more by electric light bath cabinet, with stool pulled forward and feet outside cabinet on floor, as the heat at a closer distance was too intense for the tender areas. In this way we were able to get the light well around to the sides of the chest at one sitting, and much better than by the deep therapy lamp. This was followed daily by air cooled ultra violet at 30 inches for three minutes. No dressings were used, and the patient wore only a hospital gown tied in the back; blisters were not opened, but allowed to absorb, and scabs were not pulled off, but allowed to fall off by body movement, or friction against gown in walking about or lying in bed, which he did without pain or discomfort. Dismissed from hospital as well on eighteenth day. This patient had no temperature, no pain, no urinary suppression, no complications whatever during the whole course of treatment, and no scars when dismissed. I might say this case was quite a contrast to another case of burn that was in the hospital at the same time being treated in the old way and patient had to have opiates constantly, and then suffered a great deal of pain and loss of sleep.

Case Two: Mr. J. R. C., referred by Dr. G., age 48, white; occupation, insurance agent; admitted to hospital by ambulance June 20th, 1925.

Present Illness: Struck match in basement of his home to light water heater, when there was an explosion from leaking gas, burning patient badly and wrecking the house.

Physical Examination: First, second and third degree burns to the face, head, ears, scalp, neck and both arms from elbows down. Patient nonrecognizable.

Laboratory Examination: Urinalysis:—Specific gravity, 1.015; albumen, a trace.

Treatment: Light penetration by deep therapy lamp one to two hours daily, followed by ultra violet, air cooled, given at variable distances and variable time, depending upon parts treated, as there was so much involved, including eyes, ears and nose, that several exposures were necessary at each treatment. Water cooled ultra violet was used when and where necessary during the course of treatment. The only dressing was rubber tissue between the fingers at night to keep them from sticking together. A rubber covered pillow was used to rest the hands upon so they would not stick to the bed clothing. This patient had a few doses of morphine during the first few days, and, although urine contained some albumen on admission, he had no kidney complications. He was discharged on the sixteenth day, although he should have stayed in the hospital longer, but was anxious to get out on his insurance debit. This burn, while not involving as much surface as some, was about the worst I have seen. I had known the man for several years, but did not recognize him when I was called to his room. His hair was burnt off, his ears, lips, nose and eyes were in a terrible condition. We thought for a while he would lose his lower lip and nose and possibly the ears, but they healed up nicely without a scar. The wrists were so badly burned we expected contractures, but they are perfectly normal, and the only scarring is a small keloid of the right little finger, due to the fact that when he left the hospital he had large scabs on his right hand and, although he was ordered to return for treatments until the hands were well, he did no do so, but removed the scabs himself before they were ready to come off. He is more than pleased with the results, and is one of our biggest boosters.

Case Three: Robert C., age 4, white.

Present Illness: Was playing in bonfire when coveralls caught fire, burning both legs to the trunk.

Physical Examination: Second and third degree burns, complicated with whooping cough.

Treatment: Undressed and put to bed at home with 300 watt lamp and improvised reflector made at tin shop, suspended over the burned area. No dressings. His gown was pinned up around the waist, so as to expose the burned parts to the air and light. Light kept on constantly day and night; blisters were not opened, but allowed to absorb and the scabs allowed to drop off of their own accord. This little patient moved about in bed to allow the light to get to the posterior portion of the legs and thighs. He had no pain or loss of sleep, no complications, but was up and dressed on the twelfth day and riding tricycle about the house, which had a great deal to do with keeping down contractions at the knee joint. He knocked the scabs off by the pedal of the tricycle, getting some infection therefrom,

and was taken to the hospital and given two treatments of ultra violet light, water cooled. He is healed perfectly, with no scars or contractures. I wish to mention the fact that in these cases no skin grafts were necessary, as the epithelium grew nicely from the edges of the normal skin and covered the whole area.

CONCLUSION

Light therapy is the treatment *par excellence* in burns for the following reasons:

1. It relieves pain.
2. Keeps down infection.
3. Stimulates epithelial growth.
4. Eliminates scars and contractures.
5. Normalizes the red and white blood count.
6. Accelerates elimination.
7. Normalizes body metabolism.
8. A wonderful tonic.
9. It makes a grateful patient.

DISCUSSION

Dr. Roy W. Fouts (Omaha, Nebr.): Fearing perhaps that there may be some present who have not had an opportunity to observe results obtained such as mentioned in this paper, one might conceive that it sounds like a fairy tale. I want to support everything that Dr. Kessler has said, because I have a little over three years' experience treating burns in the main by the treatment he described in his paper. I recall just about a year ago a very severe case. There was a little girl between six and seven years old whose clothes caught fire and she was burned from below her waistline to her forehead, including practically the whole of her back. The left hip and left arm were terribly burned. I saw her after almost a week had elapsed. She had been in the hospital during that time, but I had not been called to see her. She was lying in a crib naked, with the sheet up over the top of the crib, half off of her, and they had just been throwing handsful of zinc stereate onto her in her bed. She had a temperature of 102. She had been unable to sleep, complained bitterly of pain in her stomach for two days. The whole area was covered by crust and scabs from the exudate and from the zinc stereate, and you can imagine what it was like. It made one sick to look at it. She was a beautiful little girl who could only lie on her face and suffer intense pain.

I did not know what to do. I wished that I had not seen her. The surgeon whose work I was taking care of during his week's vacation had this as one of the cases that fell on me. I took her to the operating room the next day, gave her an anesthetic, and completely cleaned that area. We estimated that we had in the neighborhood of more than 100 square inches of surface that was ulcerated, and practically all of it third degree. We cleaned her up and took her down to the light department and gave her the radiant light for about thirty or forty minutes, followed by actinic. The next day we did the same thing again, and we gave her no more dusting powder or dressing of any kind. We simply put her to bed.

By the third day these raw areas were crusted over, and again we gave her an anesthetic after an application of olive oil, and cleaned that all off again. After that we put her on moist dressings of 1:5,000 bichloride of mercury and kept them moist, and continued these treatments daily. Immediately she was relieved of her pain, not all of it, but it was nothing like what she had had.

I think the cause of most of the pain is secondary infection, the same as in x ray burns. I have had some experience treating x ray burns. As soon as you begin your light therapy and treatment of x ray burns, you will notice that almost immediately you will get a relief from

pain. I am convinced it is because of the fact that you sterilize your area and it is the mixed infection that produces pain.

A number of local men said that case could never be healed without skin grafts. Suffice it to say that it did heal. I have not seen her since early in the spring, when she was completely healed. There was a slight contracture right at the juncture of the posterior axillary space and the anterior surface of her left forearm. She was completely healed, the skin was soft and pliable, and it was a revelation to all of us to see it heal in that length of time.

We have treated a number of other cases of different degrees and different sized areas with a great deal of satisfaction. I am sure it is the only treatment. If you have not tried it you ought to because you owe it to your patients to do it. One trial will convince you.

There is just one thing about which I cannot agree with Dr. Kessler. That is his leaving those scabs over the area treated. Ultra violet does not penetrate very much, and if you are going to get your bactericidal as well as your biological action you must get rid of those scabs and apply the light direct to the surface. We do that. Every day it is cleaned up and the edges cleaned very, very carefully. Of course, you have to apply your moist dressing, and any islands come away quite easily. To the edge of the wound we apply vaseline just over the edge of the burn so we are not pulling loose any of the epithelial cells that have started to come across. Of course, if we have one island out in the middle, that must be protected carefully because it will save weeks and weeks of time.

I do believe you should keep it clean, you should keep your scabs off, and it will grow faster.

In your second degree burns that is perhaps not so essential as in third degree burns, but I believe it is good practice.

There were some very interesting articles about a year ago in the A. M. A. Journal by some surgeon in the East, dealing with the treatment of burns, in which he advocated that it is good treatment, though perhaps severe, when the case comes in with the skin hanging in shreds and with blisters and perhaps with scabs and scales, to go after it with a scrub brush and clean it up. That may sound a little severe, but I think it is good treatment to get it absolutely clean. It will take you a long time to do it in a case like the one I mentioned. It would take one technician two or three hours, but it is worth while, and if you haven't tried light treatment of burns, there is something that will surprise you.

DR. O. W. WYATT (Manning, Ia.): I had a case of one little girl who was standing on an oven door, jumped off, and pulled a teakettle of water over her and burned her from her hip to her ankle. It was a second degree burn, some of it was third; the skin was entirely gone.

I treated her with the light. I put her under the light not twenty minutes, but fifteen hours out of twenty-four, with the light not too close. The queer thing was that she would ask for the light when it was taken away.

I have another little trick that I use with these burns. If you use this you will not have any crusts and the skin will grow. We know that some of our good friends use adhesive plaster when they burn off a breast. After you get your granulation, you put a little adhesive plaster over the edge of the skin and wound, and leave the holes for drainage. Your little islands will grow up and the epithelium will spread right out.

I can show many of these cases of which I have taken pictures which show these little islands just like little mushrooms all over the surface, and if you do not pull them off they will do the trick for you. I think half of our success in these cases is due to how we dress our patient and what we do. We must use a little common sense.

I have another case that is a burn in combination with a destruction of a gunshot wound.

I had a boy who was going out to shoot a crow; he thought the crow was very wise, so he put the gun behind him. He pulled the trigger with the muzzle of the gun on the inside of his ankle, and shot a hole through a rubber boot, took off the end of the tibula and went right through into the instep of the foot. You could lay your wrist into the furrow that was ploughed through there. The tissue where the gun touched it was burned. The boot and clothing stopped part of the burn. The bone was shattered.

In this case the pain was intense for a while, but I treated the boy by cleaning it out, putting him under the light, but for the first three days he had quite intense pain. I told him, "If you cannot stand the pain we will take off the foot and you will be relieved." He thought he could stand it for a few more days, and it cleared up. This boy's ankle cleared up in about three months.

In the treatment of this wound I used eosin. Some of you would use mercurochrome. Some would use gentian violet. It is just according to what you want to use. I think the main thing is not to use it too strong. The crystals act as little mirrors to help carry the ray down into the depth of the wound. That is my theory, and that is the theory of some others. It may have some little antiseptic value.

Dr. F. B. Moor (Loma Linda, Cal.): May I present our experience with paraffin dressing of burns. We use a light as well. However, we don't make such long exposures. You all know the technique, spraying the hot paraffin with a sprayer onto the bare wound. It does not cause much discomfort. Then, if you desire, you may put on a layer of gauze and spray on more paraffin and cover over the edge of the wound so that it is well protected and runs on to the normal skin.

In the next twenty-four hours there is enough exudate from the wound to simply lift off the paraffin and the dressing without disturbing at all the new-formed epithelium. Paraffin dressings are non-irritating, and that procedure makes a wonderful treatment, combined with light.

In the treatment of burns we must not forget the general treatment. All burns should be treated with an excess of fluids, proctoclysis, by mouth, intravenously, any way you can give them. The larger the burn the more fluid you should give.

Dr. T. T. Gibson (Middlesboro, Ky.): This paper on burns is a very interesting one. About two years ago a man working in a foundry spilled some melted iron down his shoe. That particular day he was not wearing the regular foundrymen's shoe that the men are required to wear; he was wearing his laced shoe, which was not very tight around his ankle, and a good deal of this melted iron went inside the shoe and he could not remove the shoe. Naturally, he had a deep burn around the ankle.

When they sent him to the office to see me I considered amputation. However, I used some ultra violet light, and the next week the man was on the job again. Since then, when I get a call to see someone with burns, I tell them they must bring the patient to the office where I can use the light or I can't see them.

Dr. James Patterson (Vancouver, B. C., Canada): I have seen a good many burns, and I am very much interested in hearing of the effect of light on burns. There is no doubt that it is reasonable and that it should be helpful.

I am particularly glad that Dr. Joslyn called our attention to wax, because that is a thing I wanted to speak of. I have been practicing at times where it was utterly and hopelessly impossible to get anywhere near an electric light plant, and I have had complete cessation of pain by the application of wax to a large burned area, first, second and third degree burns.

As Dr. Moor said, in the course of twenty-four hours if your unburned edges are covered there is enough exudate to lift the wax so you can re-

move it, and you need not bother with any moist dressings, and you are not troubled with crust, and you get a healing that is very satisfactory. I would suggest to you the advisability of combining with your radiant treatment the use of wax. That is the experience of not a few but hundreds of cases with burns where we have been unable to get at a light plant. From now on, of course, when it is possible to use the light I shall use it and see if the combination is more helpful.

DR. E. B. KESSLER (St. Joseph, Mo.): I am very glad to hear so much discussion on this paper on the treatment of burns. I thought I was going to tell you about something, and that you wouldn't all try to tell me how to treat these burns with wax, because I have tried it several times. I think next to the treatment that I have described, the wax treatment of burns is the best. If your patient can stand the application of wax you are all right. I have sprayed it on with little sprayers that we have on atomizers, with the wax set in a water bath, I have painted it on with a camel's hair brush, and I have put it on in nearly every way, and I have barely gotten away with my life several times. The patient really doesn't appreciate that. The end results are very good, as you say; the serum seems to lift the wax up and allow the epithelial growth to go on, and the results are good.

But the very thing that I want to get away from is the applications that you are putting on the burns now. Burns come to us, as Dr. Fouts described, covered with zinc stearate, covered with unguentin, with zinc oxide lotion, with carron oil, and a little bit of everything. That is the very thing I wanted to get away from. If there is any chance in the world for infection and the doctor doesn't get it when he puts those things on he should be disappointed, because it is generally there.

In regard to what Dr. Fouts said about the removing of scabs, these burns I have described today were fresh burns. One came in the ambulance within ten minutes after the burn. The other happened in the laundry in the basement of the hospital, and I got it in less than ten minutes.

The first thing we did was sterilize the burn with the deep therapy and ultra violet lamps. Sterilize the area beneath these scabs. It doesn't make much difference whether the ultra violet penetrates the scab or not. The scab acts as a dressing over the sterile area beneath.

If we get a burn that has already had all of these other treatments that you have mentioned, it is very reasonable to suppose that we should remove those scabs, as Dr. Fouts recommended, and get down to the bottom of the thing, but I believe if you sterilize that thoroughly right after the burn your scabs will form over and you will not get any infection.

Sometimes in cases where the scabs are at flexors, they get so tight and hard that they act as splints. You might stop and consider whether or not nature intended them for splints. It might be. In those cases I have used normal saline solution, which has a tendency to soak the scabs loose, especially on the hairy parts. I have soaked some scabs loose when they were ready to come up; one could see beneath them, but they were being held by a few hairs. By soaking those scabs we could get good results.

If you will start with your light treatment at the beginning of your burns you will have very good results. As one of the doctors said, when you turn the light off of the patients they cry for it.

EDITORIAL

ARCHIVES OF PHYSICAL THERAPY, X-RAY, RADIUM

A Journal of Ideas and Ideals.

A. R. HOLLENDER, M. D., Editor
ALBERT F. TYLER, M. D., Managing Editor

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—of—
Physical Therapy
in conjunction with
The Fifth Annual Meeting

American College
—of—
Physical Therapy

Oct. 18th, 19th, 20th, 21st, 22d, 23d, 1926

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A. R. HOLLENDER, M. D.
Chairman Program Committee

COUNCIL OF PHYSICAL THERAPY

The Council on Physical Therapy has been developed officially in the manner in which the Councils of the American Medical Association have usually arisen. In the first place, there has been a growing sentiment for some twenty-five years that physiotherapy had certain merits as well as demerits. Unfortunately, up to the present time it has suffered more by its friends in some instances than it has by its enemies. Those friends have been the men who have exploited physical therapy, not with the best scientific interests in mind, but perhaps for

gain. They have been sharp-sighted and shrewd men, since they have seen that the thing had much actual merit; they have been more sharp-sighted in knowing and in recognizing the tremendous suggestive value that attaches to actually doing something for the patient aside from giving him a certain amount of advice, in actually laying hands on the patient and confronting him with vast and intricate apparatus, frequently apparatus that would make a great deal of noise, apparatus that had a tremendous appearance, that was quite costly and looked costly, and made a big show. Anybody who knows anything at all knows that the average man is impressed by that sort of thing.

In reading the history of medicine I came across an advice to physicians printed by an old German in the early part of the nineteenth century. One of the first things he said to the young man, and he said it in all seriousness, was, "Make as good a show as possible, because there is nothing that impresses the patient so much as that." Many men have seen and recognized these particular factors of physiotherapy.

At the same time, since the earliest records of medical history, it has been recognized that physical methods have real value. Hippocrates recommended massage, dietotherapy and hydrotherapy. Hippocrates accumulated the first scientific collection of all first great medical encyclopedia.

Very early, also, it was recognized that other modalities, as they are called, had real value. When drug exploitation reached a state of scandal so that it became nauseous to the leading men of the medical profession, they organized a Council on Pharmacy and Chemistry as a weapon for the defense of scientific medicine. When Dr. Frank Billings made his first public address on the fact that a Council on Pharmacy and Chemistry was needed and called certain manufacturers by their right names, he was threatened immediately following with seven libel suits, none of which matured.

It is an interesting thing that that Council through its work over a period of more than twenty years—it was organized in 1905, I believe—has laid the way so that that the small manufacturers have recognized the advantages of proper control by the Council on Physical Therapy, look with interest on the whole movement and whole plan and probably will cooperate, even if they don't want to cooperate.

At the meeting of the House of Delegates of the American Medical Association at Atlantic City, Dr. Joseph Smith of Wisconsin introduced a resolution calling attention to the fact that light therapy, electrical therapy, mechanical therapy and other methods, had now received public and scientific recognition, things were being advertised with unjust claims, exaggerations were the basis of most physical therapeutic literature, and asked that the American Medical Association look into the question and standardize this method of treatment. He recommended the establishment of a Council. That resolution was referred by the House of Delegates to the Board of Trustees of the American Medical Association. At their meeting in September the Board considered

a list of names that was presented to them by the General Manager of the Association, and from that they selected a Council. Practically all of the members have already accepted their positions on that Council. The pathologists on the Council are two in number, Francis Carter Wood of New York City, a man widely known for his research on cancer, particularly for his study on the effects of radium and the x ray on cancer; Dr. Alfred S. Warthin, Professor of Pathology at the University of Michigan, who is a well known pathologist. The physiologists include Walter B. Cannon of Harvard University, Professor of Physiology, and Dr. H. B. Williams of Columbia. It includes two physicists, men who have given special attention to the underlying basis for apparatus of this type. One of them is Compton of the University of Chicago, whose work on the atom and on physical energy is causing him to be considered as a very likely candidate for the next Nobel prize in physics; the other, Dr. Bovie, Professor of Biophysics in Harvard University, a man who has given much attention to light and radiant energy of all types.

The plans of the Council include a committee to direct the preparation of a series of articles comparable in scope to the series recently prepared on glandular therapy. It is hoped to select from all of the best possible men in the United States those who have given special attention to various phases of this problem and to publish a complete series of articles first in the *Journal* and later as a book, which will give the present status of physical therapy in all fields, light, electricity, hydrotherapy, adjustment, massage and all such matters as that. That series of articles will include articles on the history of that method, its physiology, its pathology, its actions and uses. In that way we will have at least a basis from which to start and on which to work in our acceptance and rejection of various apparatus which may be offered for advertising in the *Journal*.

Another matter of great importance is the standardization of nomenclature, so that when people talk about physical therapy they will know what they are talking about. When you read a paper in this subject and you read about endothermy, diathermy, surgical diathermy, medical diathermy, electrodesiccation, electrocoagulation, radio knife, you realize that probably no two men are talking about the same thing at the same time in the same way. You realize the importance that must attach to this standardization of terms in this field. When you look up the literature in this field your search is often complicated and confused because you look up an article which you think is going to be on one subject, and when you get to it find that the man who is writing is not even writing on that subject; he has used the wrong term in giving his title to his paper, and the indexers, who do not claim to be authorities on these various forms of physical therapy, get the articles into the indexes according to their titles.

One of the first duties will be to establish a nomenclature in this field so that we can all talk about the same things and recognize what we are talking about.

Then comes the matter of passing on the apparatus in this field. There are in existence in this country today perhaps 100 different firms manufacturing electrotherapeutic apparatus alone, without relation to the firms that manufacture all of the other associated material that comes under the heading of physical therapy. For instance, the question has been raised as to whether these colon filling stations that exist in New York City with the special apparatus for that purpose are properly within the scope of the Council on Physical Therapy.

Then there are the other types of apparatus for similar purposes. The question has been raised as to whether chiropractic and osteopathy come under the heading of physical therapy, and it is a question as to whether that cannot be considered a form of adjustment, mechanical manipulation of the body, and whether such a Council might not well issue a definite report tion of the body, and whether such Council might not very well issue a definite report as to the actual basis underlying such methods, disregarding them entirely from the standpoint of the extremely limited education, because that is a function of the Council on Medical Education. The entire question of the education of those engaged in the practice of medicine comes under that Council.

The manufacturers throughout the country have indicated their desire to cooperate with this Council and to have their apparatus passed upon. You may wonder how this Council will exert its authority, how it will get a backing that will be even more than the backing of the American Medical Association, because obviously those of you who have served on medical committees from time to time realize much the same as I do that many of them are engaged in rather fruitless efforts, they meet and they discuss and they pass a resolution, and then that resolution lies there and that is all it ever does. It may get a little publicity, but usually it lies—that is, it physically lies.

The Councils of the American Medical Association, however, have the support of the *Journal*, and the *Journal* is a considerable support. The *Journal* of the American Medical Association will refuse to accept advertising of any products not passed by the Council on Physical Therapy. That means to say that the product itself must actually do what the manufacturer says it will do. It must yield the amount of energy that he says it will yield. It must not deteriorate within a shorter period than he says it will last. The claims that are made for it, the therapeutic claims, must be within the bounds of reason from a theoretical standpoint and must be supported by a sufficient amount of clinical evidence to justify the claims.

That, as you see, is a considerable contract. Not only must the advertising literature offered to the *Journal* of the American Medical Association be honest, but all of the other literature offered by the manufacturer must be honest, including all of the postal cards and circulars that he sends out. If possible his detail men will be asked to confine themselves to something similar to

what is said in the circulars and in the advertising matter. I think that one of the best effects of this will be a very prompt discontinuance by manufacturing firms of post-graduate courses for physicians. I have always been suspicious that firms who give post-graduate courses for physicians give those courses with the idea of selling apparatus. I rather imagine that the establishment of this Council will cause a discontinuance of that practice. Men will feel that the physician need no longer go to the manufacturer for his graduate instruction in an electrical and physical therapy line, but that there will be a centralized headquarters to which he may address his questions and from which he may expect to receive a reply.

From that point of view the Council can expect a great deal of support. The manufacturers realize the situation, and I believe that we are about to start one of the most remarkable bonfires in the burning of ancient literature that has ever occurred in the history of medicine, unless it was the time when Paracelsus went out in front of the school and burned up his copies of Galen and Hippocrates.

The manufacturers have already been approached, and practically all of them have agreed to our plans. Several of them have paid prompt visits to the headquarters of the American Medical Association, bringing all of their literature with them, samples of everything they had, and said, "Here it is. Now do whatever you wish with it. We want to get started right."

You can look forward confidently to a real basis for physical therapy in the future.

MORRIS FISHBEIN, M. D.,
(Editor, Journal American Medical Ass'n.)

OUR COLLEGE POLICY

Hydrotherapy was born in the mists of antiquity and was well defined therapy before Winternitz was born, but Winternitz did do probably more than any other man to attempt to put it upon a real scientific basis. No one who ever saw the man or saw his work could help feeling that he was endowed richly with a scientific spirit, and that his endeavor really was to make a contribution to medicine.

It is an easy thing to agree with another individual, but I do thoroughly agree with Dr. Fishbein that physical therapy has suffered more from its friends than from its enemies. I feel that an era is opening, that there is a rift in the clouds, and that perhaps a little later we will see the bright sunshine of truer and more accurate scientific knowledge.

The College is organized to back up and help Dr. Fishbein and his Council and the American Medical Association in anything that they want done. We want things as they should be, and I think my readers will bear me out in saying what I have reiterated with a constancy that is perhaps becoming fatiguing, that after all we are not physical therapists, we are medical men,

we are practicing medicine and surgery. Our object is a laudable one, the restoration of the sick to health, the relief of their disabilities, the correction of their deformities and the relief of their mental attitudes and sufferings. Viewed from an altruistic and ethical standpoint, nothing could be higher, and nothing could be lower than to use any means that was not legitimate and correct. Perhaps we have not been able in every instance to correctly use the yardstick or the gallon measure in the correct estimate of the measures that we have employed. But in the near future we live in the hope these will be brought to us in such a way that we can employ them legitimately and properly in the practice of medicine and her specialties.

We have now strong allies. This is a war that will have to be waged. Many times will we have to go over the top. Many times will we have to face the barrage of the enemy, but that is nothing new to the doctors, that is nothing new to our great association that has endeavored always to place itself on the highest plane. Though many fall by the wayside and many may suffer grievously from wounds, yet in the long run we must all feel that this is the parting of the ways. This is the time when all good men and true should get together, when they should not only stand back of all that has been done and is to be done, but we should lend every aid possible to the achievement of the higher ideals and the practical practice that has been outlined to us tonight.

Curran Pope, M. D.

FELLOWSHIP IN REHABILITATION

Beginning July 1, 1926, a six months' course will be available at the Stanford University Hospital to a recent graduate in medicine who has completed at least one year's hospital work in medicine and surgery. This opportunity is offered to stimulate and to acquaint members of the medical profession with the value and use of physical therapeutic measures in the treatment of diseased and disabling conditions, especially in the preparation for practicing industrial medicine.

WESTERN PHYSIOTHERAPY ASSOCIATION

The eighth annual meeting of the Western Physiotherapy Association was held at the Hotel President, Kansas City, Mo., April 15 and 16, 1926, under the presidency of Dr. A. David Willmoth, Louisville, Ky. The following officers were elected for the ensuing year:

President—Lynne B. Greene, M. D., Kansas City, Mo.

First Vice President—J. E. G. Waddington, M. D., Detroit, Mich.

Second Vice President—O. M. Moore, M. D., York, Neb.

Secretary—Charles Wood Fassett, M. D., Kansas City, Mo.

Treasurer—W. P. Grimes, M. D., Kansas City, Mo.

Registrar—E. J. Leigh, M. D., Hiawatha, Kan.

Board of Trustees—A. David Willmoth,

M. D., Louisville, Ky.; F. E. Dillenbeck, M. D. Eldorado, Kan.

The association meeting was preceded by a six-day session of the Western School of Physiotherapy, a class of 75 attending. Next meeting will be held in Kansas City, April, 1927.

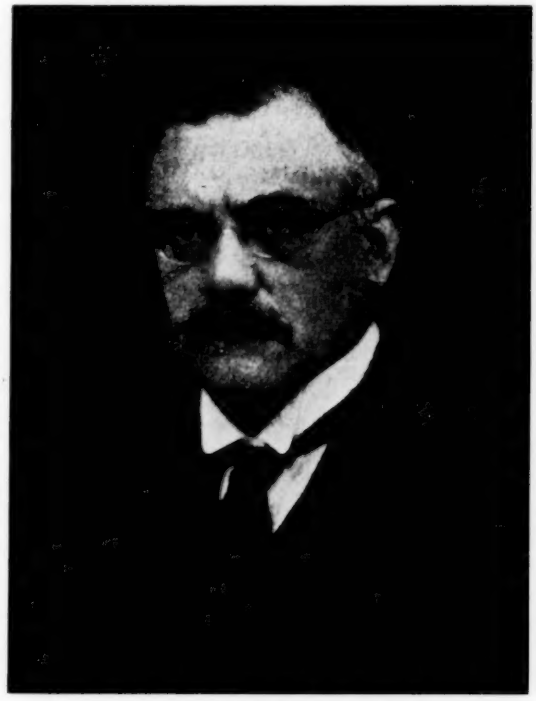
NEW MEMBERS

Very little has appeared in the editorial columns regarding the many benefits to be derived from a College membership. It is true that the College of Physical Therapy is still in its very infancy, and that many of the big things are to be performed during the next year or two. The College has, however, made many accomplishments and stands out today as the leading institution of its kind in the United States.

There has been no active membership campaign, and yet the names of members are being added to our roster daily. The standards of the College are high, and while the requirements for membership are still reasonably lenient, steps are being taken at the present time to make it rather difficult to gain entrance.

Before resolutions along these lines are enacted at the Clinical Congress to be held in October, the editors suggest that each and every active member of the College make a special effort to sign up one new worthy candidate for membership. In other words, let each fellow consider himself a membership committee of one for this purpose, and let's see how many new and worthy names will be added during the next few months.

The American College of Physical Therapy is not endeavoring to be known as an organization with a "wholesale" membership list, but desires to stand out with few members, if necessary, as an institution worth while, standing for high scholarship.



IVAR BAGGE

Ivar Bagge was born in Gothenburg, Sweden, on October 23, 1865, and died June 23, 1925. Here he was reared to manhood, educated and began a practice which resulted in the expansion of the art and science of radiology, and the introduction and development of physiotherapy.

It was on April 3, 1899, that Bagge set up his first roentgen apparatus in his con-

sulting room, mounting it on a dining room sideboard so that it might not disfigure his quarters. From this humble beginning the great Medical Light and Roentgen Institute of Gothenburg grew. Constantly keeping abreast with the development of the science of radiology he began the use of the light rays. In the winter of 1899-1900 Ivar Bagge began the treatment of skin diseases, particularly the lupus group, with the light. A few years later, 1907, he received official recognition from his state for this advancement in the science of dermatology.

In 1910, following his years of close observation of the workings of medical electricity abroad, Ivar Bagge purchased his first physiotherapy apparatus and on October 8 of that same year performed his first cancer operation using the high frequency current.

From that time to this, Ivar Bagge has ranked as one of the leaders in the development of electrocoagulation and cold cautery operations for cancer in Sweden. His enthusiasm closely governed by his keen scientific observation and skepticism rendered him a pier for the organization and scientific achievement of his one ambition—the recognition of radiology and physiotherapy by his countrymen.

STOMATOLOGY FOR DENTISTS AND PHYSICIANS

The American Stomatological Association, in cooperation with the Faculty of the Post-Graduate Medical School of Stomatology at New York City, announce a special course of ten lectures for graduates in dentistry and medicine in "Stomatology and Focal Infection," to begin October, 1926. The classes will be limited in number and students will be registered in the order in which their applications are received. For information, address the Registrar, Post-Graduate Medical School of Stomatology, 135 Elliott Place, New York City.

AMERICAN BOARD OF OTOLARYNGOLOGY

In addition to the examination held at Dallas on April 19th and at San Francisco on April 27th, another examination will be held at the Otolaryngological Clinic, Royal Victoria Hospital, Montreal, on Tuesday, June 1st.

Information may be secured from the Secretary, Dr. H. W. Loeb, 1402 South Grand Boulevard, St. Louis, Missouri.

THE STUDENT'S LIBRARY

BOOKS REVIEWED

SYNOPSIS OF GYNECOLOGY. By *Arthur Gray*, F. R. C. S., M. R. C. P., Late Gynecological and Obstetrical Tutor and Registrar Middlesex Hospital. Cloth. Price $3.75. Pp. 352. New York: Longmans, Green & Co., 1925.

This little book is in reality an outline of gynecology, covering the subject in a complete yet concise manner, and is presented to the student for a reasonable sum. It is intended by the author for use as an aid for rapid review when studying for examinations and for use as an outline by tutors. Such a text probably fills an important place in the English schools where it is printed and should prove a great aid to those attempting to master the crowded curriculum of medicine in this country. Such a text cannot, however, take the place of a regular textbook, but might be profitably used as an aid in running over points by teachers of this subject.

The arrangement of the text follows the field anatomically. Under each anatomical structure the various diseases affecting that structure are outlined. That portion of the text treating with the endocrine glands and their relationship to gynecology is well covered. Throughout the text only known facts are stated and may be used to assist the student to arrange this subject properly in his mind.

C. F. Moon, M. D.

LANDIS COMPEND OF OBSTETRICS. Tenth edition. Revised and edited by *Clifford B. Lull*, M. D., Instructor of Obstetrics, Jefferson Medical College, Philadelphia, etc. Cloth. Price $2.00. Pp. 283, with 84 figures. Philadelphia: P. Blakiston's Son & Co., 1925.

A compend should be a handy, concise review book for medical students and busy practitioners, containing the essence of the best knowledge of the present day subject unhampered by detailed theoretical academic discussions or generalizations. A compend is never to be considered as a text for collateral reading. The compends of P. Blakiston's Son & Co. fulfill admirably these requirements.

Discussing first the anatomy of the pelvis and reproductive organs, the subject of physiology naturally follows. The signs and pathology of pregnancy is subsequently considered. The stages, diagnosis and pathology of labor preceded the discussion of the obstetrical operations. It is in this portion that the Potter method of podalic version, Kieland forceps, and other marks of the progress of the science of obstetrics can be noted. The puerperal period is then reviewed before entering into a discussion on the newborn child. The question and answer system has been effectively used throughout the text.

C. F. Moon, M. D.

COMPEND OF GYNECOLOGY. Fifth edition. By *William Hughes Wells, M. D.*, Late Assistant Professor of Obstetrics, Jefferson Medical School, etc. Revised, edited and enlarged by William B. Harer, M. D., Instructor of Obstetrics, University of Pennsylvania. Cloth. Price $2.00. Pp. 371, with 167 illustrations. Philadelphia: P. Blakiston's Son & Co., 1925.

Here is another of the compends from the press of Blakiston, designed to present in a brief abstract manner the modern concept of the science of gynecology, medical and surgical. Not in any sense are these texts to be considered as textbooks, but they do have a distinct value in their use as handy reference books both for student and practitioner.

C. F. Moon, M. D.

TREATMENT OF KIDNEY DISEASES AND HIGH BLOOD PRESSURE. By *Frederick M. Allen*, M. D. Part I. Cloth. Price $3.00. Pp. 206. Morristown, N. J., The Physiatric Institute, 1925.

This monograph is intended for both the practitioner and the patient, and should interest many since "the renal-circulatory disorders are the greatest problem of medicine today."

The primary cause of diseases of the renal-circulatory organs in general is believed to be infection, most commonly the streptococcus. Among the conditions usually mentioned as contributory causes of renal-circulatory disease, the writer believes that heredity, age and diet are important, but that the influence of civilized life, endocrine disorders and several other conditions are largely imaginary. For the prevention of the renal-circulatory disorder, he advises the avoidance of infections, the proper care of patients with infections and general dietary and habit precautions. Following such advice, the triology of nitrogen retention, edema and hypertension, the three cardinal manifestations of kidney disease, would be less apt to develop. Retention of nitrogen is the symptom *par excellence* of nephritis, since it is an immediate indication of a perverted kidney function, one independent of other organs. Edema may be either metabolic, cardiac or renal. The causes of edema are theoretical. After discarding Fischer's theory of edema as the result of acidosis, the writer expresses the belief that increased vascular permeability or the reduction of the water binding power of the blood are the most probable causes. Hypertension is an elevation of either the systolic or diastolic blood pressures above normal. This elevation does not occur normally after maturity. Regardless of age a systolic of 140 or above is looked upon as abnormal. The speculative possibilities of hypertension he outlines as: thickening of the walls of the smallest arteries; pathological vasoconstriction of the arterioles; proliferation of the endothelium in the capillaries; pressure of surrounding structures on the capillaries, and swelling or contraction of the capillary endothelium. The important remedies that he has been led to observe for these renal-vascular conditions are two: protein restriction and salt restriction. Protein restriction is recommended for the alleviation of the non-protein nitrogen retention. Salt restriction is advised for the prevention of edema and for the treatment of high blood pressure. Detailed instructions are presented for the completion of these measures together with numerous dietary principles, recipes, food tables and menus.

Undoubtedly there are statements within the texts with which various readers will disagree. But it is the simplicity, preciseness and definiteness with which the author presents the conclusions drawn from observations on 328 cases that makes this monograph valuable to all practicing physicians.

LABORATORY DIAGNOSTIC METHODS. By *John A. Kolmer*, Professor of Pathology and Bacteriology, University of Pennsylvania, and *Fred Boerner*, Associate in Bacteriology, University of Pennsylvania. Cloth. Pp. 338, with 14 tables. New York: D. Appleton & Co., 1925.

This text is designed to present in a very simple and concise manner the technique of various laboratory tests without any discussion of their value, limitations or clinical applications in the diagnosis and treatment of disease. A manual for physicians, medical students and laboratory technicians, it presents the various pathological, bacteriological, serological and chemical tests which are considered by the authors to be the most practical and essential for the successful practitioner of medicine. Histological methods and the technique of the preparation of culture media are not included. Tablet preparations are now put out by various houses for the preparation of media that greatly simplifies the problems of the men out in general practice.

The material of the text is arranged under four heads. Section one considers the clinical pathological methods, such as the examination of the blood, urine, gastric contents, bile, duodenal

fluids, feces, sputum, cerebrospinal fluid and milk. The second section, clinical bacteriological methods, includes the preparation of smears and cultures, the choice of media and growth of bacteria, the identification of bacteria through their growth and staining characteristics, bacteriological diagnoses, etc. The clinical serological methods in use today are becoming numerous, the collection of blood, separation and preservation of serum being essential but the least difficult. Widal and typhoid agglutination tests, typing of pneumococci and meningococci, blood transfusion tests, complement-fixation tests for syphilis, gonococcus, etc., all being both essential and necessary for the intelligent practice of medicine. The blood chemistry tests must usually be done where laboratory facilities are rather elaborate. For the most part, nonprotein nitrogens, urea, creatinin creatin, uric acid, sugar, chlorid and cholesterol determinations cannot be done by the practitioner of medicine, but a working knowledge of the value and indications of these methods is necessary, together with the methods of obtaining the specimens for examination.

In the compilation of the text, the publishers have printed the text material on one side of the page only, leaving the opposite page for notes—a handy arrangement for the hurried practitioner.

INTERNAL DERANGEMENTS OF THE KNEE JOINT. By *A. G. Timbrell Fisher*, M. C., F. R. C. S. (Eng.), Late Hunterian Professor, Royal College of Surgeons, England; Asst. Surgical Unit, University College Hospital, etc. Cloth. Pp. 144, with 40 plates, including 80 figures. Macmillan Company, 1924.

The author has a definite basis established upon which to present such a text. Series of investigations have been carried out by him in an endeavor to elucidate the manner in which the various parts of the joint are nourished, the role played by each part in performing its function, the etiological factors and manner of rendering damage to these parts, the immediate and resulting pathology, and the measures that should be indicated in their treatment. In other words, in the language of Dr. Arthur Keith, "there is only one form of curative magic—the application of measures founded on an accurate knowledge of structure, function and disease."

The material presented has been arranged in much the manner that it was studied. The first portion of the text is devoted to the pathology and surgery of the semilunar cartilages. Here, a glimpse into the history of internal derangements of the knee precede the discussion on surgical anatomy and physiology of these semilunar cartilages. Relatively much time and many illustrations are spent on establishing the pathology that frequently exists. Symptomatology is a tool to be used in attempting to establish the differential diagnosis, and it is the establishment of the differential diagnosis that is considered by the writer to be of prime importance. He advises, "never neglect the valuable aid afforded by x ray examination of the joint both in anteroposterior and lateral planes.....An x ray examination clinches the diagnosis in certain other conditions, some of which may simulate a cartilage injury closely, and may reveal (a) a loose body, if calcified or bony, or occasionally a foreign body; (b) fracture of the tibial spine; (c) exostoses which interfere with tendon action; (d) fracture of the joint or sprain fracture; (e) changes due to chronic arthritis; (f) myositis ossificans; (g) after the joint has been injected with oxygen, it may reveal other structures that do not normally intercept the x rays and a fracture of a semilunar may be disclosed." For their treatment, a separate detailed chapter is presented.

The second portion of the text, practically a half, considers other forms of internal derangement of the knee joint. Here, loose bodies in the knee joint, osteo-arthritis, ligamentous injuries, exostoses, etc., are discussed.

In preparation for the presentation of this monograph and in its presentation the author has done a commendable piece of work. This

little monograph arranged in a readily accessible style and containing a vast amount of information that may be obtained with the minimal amount of time and effort, should have a distinct attraction to the busy scientific practitioner.

INTERNATIONAL ABSTRACTS

Heliotherapy: Some Impressions Derived in Switzerland. Stanley F. Silberbauer, M. D., F. R. C. P. (Edin.), South African M. Record., 23:257-259, December, 1925.

The most notable advances that have been made in the treatment of tuberculosis have been the introduction of the use of sunlight and the rays of the ultra violet lamp. Most of the credit for the general acceptance of this form of treatment is due to Dr. Rollier, an orthopaedic surgeon who, dissatisfied with the results obtained in tuberculous cases by operative procedures, started a small clinic at Leysin in 1902 for the treatment of his patients by sunbathing.

Leysin had long been known as a place in which tuberculous patients did well. It was the principal station in French Switzerland for the treatment of pulmonary tuberculosis. Situated at an altitude of 4,550 feet, its position on a mountain slope with a south aspect shelters it from nearly all winds, and exposes it to the greatest possible amount of sunshine during the day.

Rollier's patients have the usual sanatorium treatment at a Swiss mountain resort with the addition of a new factor—the exposure of the body to the rays of the sun. Much of the benefit which his patients derive is probably due to altitude, fresh air, rest and diet, but in a certain class of cases his results are certainly much better than those obtained without heliotherapy.

The mode of application used by Dr. Silberbauer at the Somerset Hospital in South Africa agrees in all essentials with that used by Rollier. In South Africa, treatment is probably best carried out at high altitudes or at the seashore. Wind is always an important factor from which the patient must be carefully sheltered. The atmospheric temperature is a matter of consideration. "While we seek to expose the patient to the sunlight, we must also endeavor to protect him from the heat of the sun." This is done with a white sheet and the sanatorium, located near the seashore, has the benefit of cool air. Sunbathing should not be carried out in the heat of the day.

The patient should gradually become accustomed to the rays of the sun. Particularly in the early stages supervision is necessary for a great deal of harm may result in certain tuberculous conditions from too harsh an exposure of the body. In the average case, Rollier recommends that the feet only should be exposed the first day for three five-minute periods. On the following day, for each of the three exposures, the feet are exposed for five minutes, then the legs and feet for five minutes. During the next five days, the exposure is increased five minutes for each of the regions during each of the three periods of exposure. Thus on the fifth day the patient is having three sunbaths daily, in which the feet are exposed for twenty-five minutes on each occasion and the thorax (the highest segment) for five minutes. The exposures are increased by five minutes daily up to the fifteenth day, when, if no untoward symptoms have arisen, the treatment can be commenced by exposing the whole body at once to the sun, and the patient will be able to tolerate a sunbath of from three to four hours isolation during the day (See Chart reviewer designed from an original Rollier manuscript). Deep bronzing of the skin is produced in most persons. Certain

types, however, do not pigment well, and these do not tolerate sunbathing as well or derive as much benefit from it as those who do.

As to the indications for heliotherapy. The cases likely to be benefited from sun treatment may be divided into nontuberculous and tuberculous.

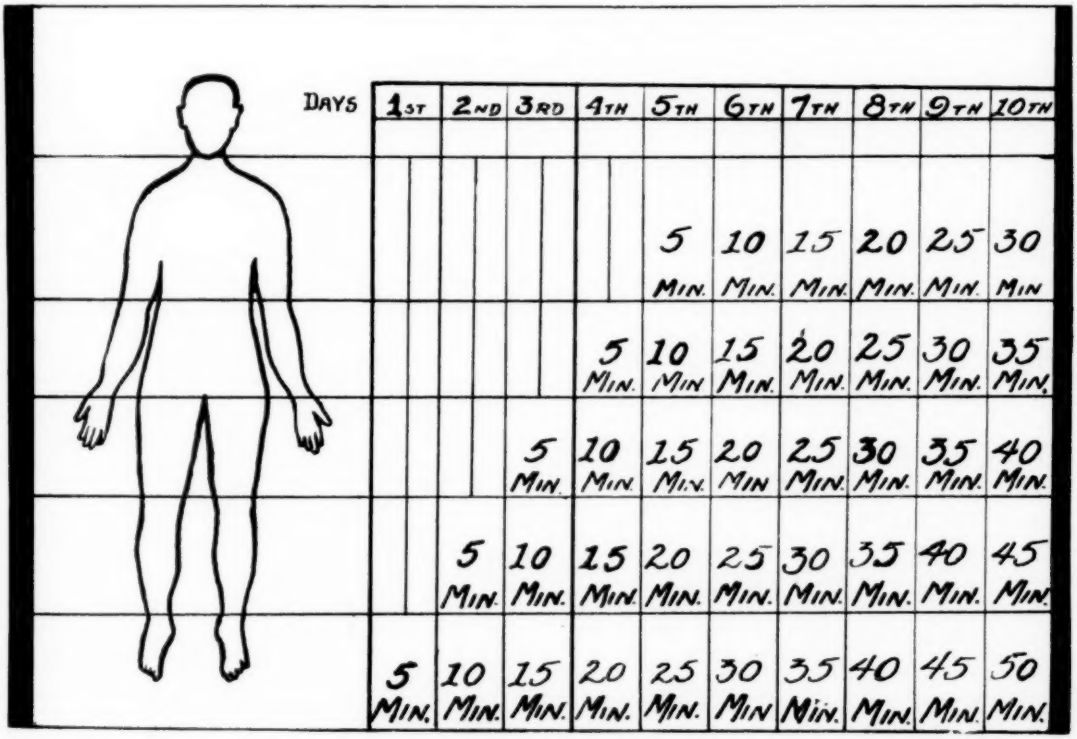
Of the former, rickets is the outstanding example. It is also shown that the sun's rays increase the nutrition of the affected parts after anterior poliomyelitis, relieves the pain in rheumatoid arthritis, and cures chlorosis. Actinic rays also have an activating action on foodstuffs. Rollier claims that the progress of the lesions of lymphadenoma is retarted by sunbathing.

The most striking results obtained from heliotherapy are in the treatment of tuberculous diseases of the lymphatic glands and of the bones and joints. In tuberculosis of the bones and joints, Pott's Disease, heliotherapy has proven of distinct advantage. Immobilization in the dorsal position by means of a waistcoat and braces is obtained. The patient is turned into a ventral position as soon as possible and equal radiation affected.

In tuberculous peritonitis good results are obtained, but the reaction is apt to be severe, and the treatment must be underaken with the great-

-DR ROLLIER'S SCHEMATIC DIAGRAM OF INSOLATION-

SHOWING PROGRESSION OF EXPOSING PATIENT TO RAYS OF THE SUN.



From the tenth to the fifteenth day, increase acco rding to same scale. From the fifteenth day, all the previously exposed portions of the body should receive th e same amount of insolation as the longest exposed part,—increasing the time five minutes daily, till a ba th of from three to four hours is taken.

est possible caution. At the beginning the abdomen should be exposed only for a minute at a time.

In lupus the results are excellent, but care must be taken to avoid sunstroke, and there are many cases in which it is more convenient to expose the affected areas to the ultra violet lamp.

In genito-urinary tuberculosis sunbathing is largely used after operation on the other kidney, with a view to preventing the infection of the remaining organ.

In pulmonary tuberculosis, it is claimed by some that heliotherapy causes hemoptysis, and often makes a latent process flare up; but Rollier has treated thousands of patients who, in addition to the lesions for which they underwent treatment, have pulmonary disease. He claims that the judicious use of sunbathing has never harmed these cases or led to hemoptysis. On the other hand, the author advises to leave experiments in that direction alone, and to warn their phthisical patients to beware of the sun.

For the contra-indications for heliotherapy, the writer mentions all cases of pyrexia, marked cardiovascular disease and acute or chronic nephritis.

"It (heliotherapy) is in no way a substitute for ordinary treatment by rest, diet and fresh air. Wrongly applied, it is capable of doing much harm, and at the beginning of treatment the patient must be carefully watched. He must be fully instructed and warned of the danger of indiscretion."

Heliotherapy. L. L. Albert, M. D., Rhode Island M. J., 9:3-4, January, 1926.

It is heliotherapy that fulfills the highest demands of orthopedics and conservative surgery by those who are fully conversant with all phases of this latest branch of medical treatment. Its application is as much an art and science as the application of drugs.

The trophic action of sunlight is seen chiefly in the skin and muscles, there being a definite relationship between aerotherapy and heliotherapy. The importance of the effect of air upon the human system, together with the action of the sun, is shown especially in high altitudes. Where the air is relatively cool, sun treatments give the quickest response.

"In arthritis, surgical tuberculosis, puerperal sepsis, anemia, rickets, osteomyelitis, nonhealing wounds and convalescence from all wasting and infectious diseases, the prophylactic qualities of the sun are even more marked than its therapeutic qualities.

"Allow the patient to bathe in air and sun, and he will respond far more quickly than to drugs and tonics alone."

IN GENERAL PRACTICE

Actinotherapy in Medical Practice. F. H. Dommisse, M. B., Ch. B. (Edin.), South African M. Record., 78:98-99, March, 1925.

A brief review of the manner of application of the actinic rays from the sun precedes an explanation of their physiological activity. Ultra violet light, intermediate between visible light and x rays, obtains its general effects from the action of its long rays. These rays attack (1) the surface cells of the skin; (2) the capillary blood vessels; (3) the capillary lymph vessels; (4) and the nerve filaments. As a result two phenomena are observed: (1) a hyperemia, and (2) an erythema, the guide to radiation dosage. Short, mild exposures cause a vasodilatation, longer exposures a vasoconstriction. But as a rule, fair people respond more readily and favorably than dark people; younger more than older people and the exposed parts of the body are less sensitive.

The ultra violet radiation of the skin enhances the bactericidal power of the body by acting on the cells of the epidermis, and by being absorbed by the network of capillaries beneath the epidermis. The rays pass through the epidermis, are absorbed by the hemoglobin of the blood, producing an erythema. The general metabolism of the body, especially the calcium and phosphorous content, is immediately improved, and

the patient feels an almost immediate sense of well being.

Ultra violet radiation can be used for a great variety of diseases, but the author sketches those with which he has had personal experience:

1. Skin diseases, as acne, eczema, furunculosis if taken early can be checked by three exposures; seborrhoea, ringworm, psoriasis, pruritis ani, prurigo require six to twelxe exposures. In premature baldness and alopecia, marked imani, prurigo require six to twelve exposures. In septic skin diseases, as impetigo, sycosis, varicose ulcers, actinotherapy is of marked benefit if preceded by ionization. For x ray burns daily exposures are most effective.

2. Rheumatic diatheses, as lumbago, fibrositis, chronic articular rheumatism and neuritis respond favorably to a combination of ultra violet, diathermy and ionization.

3. Pulmonary conditions are distinct indications for actinotherapy.

The Efficacy of Various Sources of Light in General Light-Bath Treatment. Axel Reyn, Acta Radiol., 4-541-566, December, 1925.

The author begins by briefly sketching the history of general light treatment and mentions some of the investigations made, especially by Finsen and his pupils, concerning the capacity for penetration into the living tissue, of light from a number of different sources. Various conditions and problems connected with the cure of surgical tuberculosis by means of light treatment are dwelt on, and it is pointed out that the attempts to account for the curative effect of the light in these affections have not up to the present led to any result; one question especially in this connection remaining unsolved; the question, namely, as to what particular rays in the light are chiefly instrumental in bringing about the cure. The clinical results, on the other hand, furnish some hints and show that the chemical rays—and among these notably the more long waved ultra violet, the violet and the blue ones—must be particularly important, but that also the luminous red rays play a certain role. On the basis of these considerations, the author states as his opinion that the sunlight, wherever it can be utilized, is by far the best, and that sanatoria for surgical tuberculosis should always by preference be located either in the Alpine country or by the sea, in both of which situations all these rays are present in the sunlight in a high degree of intensity. The sunlight is only of use when it contains abundant quantities of chemical light. In northern Europe it is, therefore, during a considerable part of the year impossible to profit by the sun, because the greater portion of the chemical rays are absorbed by the atmosphere. During these periods, recourse must be had to artificial light. Various sources of artificial light are mentioned, and it is strongly argued that, of all these, the carbon arc light is best. The lamps must be especially constructed for this purpose, however, because most of the lamps found in the market do not satisfy the special requirements of this particular utilization. Only direct current power can be used, because it is the light from the crater that plays the important part in the treatment.

IN DERMATOLOGY

Quartz Light Therapy in Skin Diseases. Edwin N. Kime, M. D., and Ray Shanks, M. D., Am. J. Physical Therapy, 2:299-300, October, 1925.

There are three types of ultra violet reaction that are of therapeutic value to the clinician. They are all manifestations of the same reaction, but vary only in degree:

1. Stimulative erythema. This is a faint flush appearing four to six hours after the treatment. It is somewhat bactericidal.

2. Regenerative erythema. Erythema and redness is produced almost to the point of blistering. It gives stimulative and bactericidal action. This is especially good in practically all the dermopathies with infection, atrophic der-

mopathies, parasitic infections of the skin and disorders of the skin glands.

3. Destructive erythema. This is used when vesiculation is required. It is indicated in skin conditions in which hyperplastic and hypertrophic lesions prevail.

In the treatment of lesions of the skin, the authors remind us that there are several factors to be kept constantly in mind and the dosage varied accordingly:

1. Always try to have the rays transmitted to the body at an angle of 90 degrees.

2. Outdoor sunburned individuals always require longer treatments than an indoor office individual.

3. Infants require shorter exposure than adults, due to a more tender skin.

4. Parts of the body covered with clothing are more sensitive than exposed parts.

5. Brunettes take a little longer exposure than blondes.

6. A body covered with hair will take a slightly longer exposure than where there is no hair.

Actinotherapy offers the practitioner one of the most valuable adjuncts in the treatment of diseases of the skin. It eases hyperesthesia, is tonic, stimulant and bactericidal. Intelligently operated, permanent harm or disability never ensue, even following a so-called heavy radiation.

IN TUBERCULOSIS

Heliotherapy in the Treatment of Tuberculosis. Horace LoGrasso, M. D., Therapeutic Gazette, 49:539-552, August, 1925.

After briefly outlining the advancement of the art of heliotherapy in its application to tuberculosis, Dr. LoGrasso summarizes his observations in the following manner:

1. That our present knowledge of the etiology, portal of entry and dissemination of tuberculosis justifies the opinion that so-called "surgical tuberculosis" is only a localized manifestation of a general constitutional disease, the primary focus of which is in the lung or lymph node, and that we must therefore treat the disease as a whole and not its manifestation only.

2. That any measures, whether radical or conservative, that tend to lower the resistance of the patient and aggravate or reactivate the disease, or that will deprive the patient of those forces that tend to build up his body resistance, should be looked upon with disfavor. Rest, fresh air and sunshine have been, and are, our mainstay in the treatment of pulmonary tuberculosis. It also holds true in the extrapulmonary type.

3. That operative procedure does not remove the cause but tends to aggravate or reactivate the primary focus in the lung or lymph node, also, by attempting to remove the localized disease area, likewise break down the wall of granulation and connective tissue which nature so kindly provides as a protection to the surrounding normal structure; thus it often opens up new areas to infection and increases the possibility of a generalized tuberculosis.

4. Operative procedure favors ankylosis and thus destroys the functions of a joint, while heliotherapy favors the preservation or reestablishment of function in a joint.

5. Operative procedure is justified only (a) in those cases in which, in spite of heliotherapy and the resulting good general physical condition, the local lesion has not shown any satisfactory improvement; (b) to correct deformities developed during the course of treatment in spite of all the efforts to prevent them; (c) to provide stability by an arthrodesis in a frail and useless articulation; (d) to evacuate abscesses, and this only by aspiration or a small incision when the pus is very thick; (e) in renal tuberculosis of the advanced stage, or where there is considerable destruction.

If surgery must be resorted to, it is best that it is preceded and followed by heliotherapy.

EXPERIMENTATION

The Influence of Ultra Violet Radiation Upon the Takes and Growth of Transplantable Rat and Mouse Carcinomata in Albino Rats and Mice. K. Sugiura, D. M. Sc., and Stanley R. Benedict, Ph. D., Am. J. Roentgenol., 14-234-240, September, 1925.

Because of the somewhat questionable effects of sunlight of the malignancy of transplanted tumor of the rat, the authors studied the effects of irradiation from the ultra violet light emitted from the quartz mercury arc lamp upon the susceptibility and growth in albino rats and mice.

In vitro experiments indicate that the proliferating capacity of Flexner-Jobling rat carcinoma was stopped by the radiation in comparatively short exposures. This destructive action appears to be due to the selective absorption of the radiation of the cancer cells.

The results of irradiation of a malignant mass at a depth in the animal body by ultra violet radiation applied externally may be summarized as follows:

1. The development of small tumors is checked by severe doses.

2. There is an increased rate of growth of the malignant tumors after inadequate irradiation of small tumors.

3. Large tumors are seldom beneficially affected by the radiation.

Radiation from a quartz mercury arc lamp does not confer resistance upon the rats and mice to transplanted cancer.

Investigations Concerning the Influence of Light on Fat and Kindred Substances. V. Malmstrom, Acta Radiol., 4:173-200, June, 1925.

The author presents a series of experiments with a preparation produced from irradiated cod liver oil. Under the influence of air and ultra violet light, cod liver oil, like many other fats, cholesterin, lecithin and a few other substances undergoes noteworthy changes. Inter alia these substances give off after irradiation an acidly reacting gas, or blend of gases, which has the property of strongly blackening photographic plates. Water extract from the irradiated fats contains substances of relatively strong chemical activity. Therapeutical experiments have been carried out with such water solutions, mostly prepared from irradiated cod liver oil. The healing of tuberculous foci seems to be accelerated in some cases. The water extract also possesses a noteworthy local pain stilling effect and has in several cases with very good effect been employed for tuberculous dysphagia and pleuritic stitch.

CUTANEOUS SYSTEM

PERTUSSIS

The Treatment of Pertussis by Roentgen Ray. Julius H. Hess, M. D., J. Iowa State M. S., 26:29-33, January, 1926.

Before offering their own conclusions as to their experiences in the light of the limited amount of work which has been done, the authors feel justified in quoting the conclusions of the men who have previously quoted series of cases. Bowditch states that in 300 cases of whooping cough treated by the roentgen ray, there was certain evidence that more than 80 per cent were benefited by the treatment. Only one fatal case occurred in his entire series. The more favorable results seemed to be obtained in the early paroxysmal stage of the disease and in the younger children.

Leonard reports that in 400 cases, compared with 200 cases not so treated, the acute symptoms were modified in at least 75 per cent of the cases when used in the paroxysmal stage. In children under one year of age nearly 100 per

cent were definitely relieved. He believes that this condition may be due to the fact that the dosage used more nearly matched the needs of the younger patients, and that modification is necessary in the treatment of older patients. He further concluded that roentgen rays do not shorten the course of the disease to a marked extent and when used in the early stage apparently do not prevent the onset of the paroxysms. He believes that roentgen ray furnishes one of the best means for at least controlling some of the severe symptoms of pertussis. It should be noted that Bowditch and Leonard reported on the same group of cases.

Struthers, tabulating 45 cases, observed that 15 per cent of his cases were promptly cured, that the whooping cough ceased entirely within forty-eight hours and did not return; 45 per cent showed relief within four or five days, as evidenced by a considerable amelioration of symptoms; 40 per cent showed no appreciable change in condition. He believes that the larger the dose of the ray given the greater apparently is the improvement. All of the prompt cures in his series except one received larger dosage—he fails to state the dose used. He concludes that the earlier in the paroxysmal stage the treatment is begun, the greater the probabilities of relief.

Kingston and Faber used one, two and three exposures at weekly intervals. Two milliamperes were given, with a distance of 12 inches, 9¾ spark and ¼ mm. copper filter. They reported 24 cases varying from seven months to thirteen years of age. Cessation of vomiting was noted, even when the whoop continued. The tendency to residual cough they believed was lessened and the course was shortened and less severe.

As the result of their own observations the authors offer the following conclusions:

1. Treatments should not be given before the paroxysmal stage is reached because their chief function is to lessen the severity of the disease. Incidentally in some of the cases there was a striking shortening of the course. This must be considered as of secondary importance, however, and the treatments should be continued with the idea in view of attaining such a result.

2. In the summer and fall group results were noted in 43 per cent, or 27 of 62 cases. In ten of these only one treatment was required. In 12 two treatments, in 4 three and in 1 four treatments.

In the winter group the number of results were fewer, a total of 25 per cent or 10 of 40 cases. Of these 1 received one, 3 received two and 6 received three treatments, respectively. The positive results were 34 per cent in the summer and fall group and 27.5 in the winter group. The negative results were approximately 25 per cent in the summer and fall cases and 47 per cent in the winter cases.

3. In our cases of secondary pneumonia, there was general improvement after roentgen ray treatment.

4. "In my opinion, excessive exposure of young children to the roentgen ray is dangerous. Therefore the neighboring organs should be protected and only the minimum number of exposures necessary for relief are to be given.

5. "I believe the results, both immediate and remote, of roentgen ray treatment in pertussis should be given further study before the method is recommended for general use.

6. "It is to be remembered that the adoption of this as a routine treatment would require a change in the quarantine regulations in most cities to permit the removal of the patients from their homes to places of treatment."

LUPUS VULGARIS

Radium Treatment of Lupus Vulgaris. F. V. Novak, M. D., Acta Radiol., 5-37-53, January, 1926.

The author mentions his experiences in the treatment of 400 cases of lupus vulgaris with radium emanation. He describes new flat applicators of his own construction, the manner of their employment and some clinical observations as a result of their application. A flat glass ampule with a thickness of the glass as being 0.3-0.5 mm., is filled with radium emanation and

is directly put on the lesion. In this way the bactericide properties of the beta rays are used and an inflammatory reaction is provocated and after its disappearance we get a white, soft scar. The single lupus knots which remain are then treated by radium puncture. Beneficial results have been obtained as the result of this method.

PRURITIS HIEMALIS

Winter Itch (Pruritis Hiemalis), William J. MacDonald, M. D., Boston M. & S. J., 192:489, March 12, 1925.

Winter itch or pruritis hiemalis is not a common dermatological condition and is frequently confused with scabies. The disease is violently itchy, nocturnal in character, often generalized, most marked on the lower limbs, and characterized by secondary skin lesions.

In the treatment of this condition, the ultra violet light and x ray are the best methods. The chest, back, lower limbs, anterior and posterior, receive an initial dose of five minutes at a distance of 15 inches. Two days later the time is advanced to seven minutes. Subsequent applications are stronger and cause an artificial erythema with scaling. The lower limbs, anterior and posterior, receive an additional fractional dose of x ray. This is repeated seven days later. The x ray is reserved for those parts associated with marked secondary lesions. For the most part, ointments are disappointing, a mildly carbolized olive oil being as efficient as almost any other antipruritic application.

PSORIASIS

The Use of the Quartz Lamp in Psoriasis. J. H. Swartz, M. D., Boston M. & S. J., 193:162-165, July 23, 1925.

Psoriasis is usually considered a chronic inflammatory disease of the skin, of unknown etiology, characterized by variously sized reddish, dry, rounded, sharply defined patches, covered with abundant imbricated silvery scales. It is one of the most variable and capricious of diseases.

The writer divides it into three classes in relation to treatment: (1) Cases with an acute onset and in their first attack; (2) cases that show a fine papulo-squamous eruption, generalized or localized, and have had previous attacks; (3) cases that show the large plaques of hyperkeratotic type of psoriatic lesions that have resisted practically all treatments.

The first class will respond to quartz lamp exposures without any other medication. Dosage and method of treatment vary with each case, brunettes requiring less than blonds, males less than females. The result of the first treatment will determine definitely the dosage. In all cases, at least three to four treatments at two weeks' interval should be given after all signs of the disease have disappeared. A warm bath and gentle removal of the scales should be done the night preceding the treatment.

In the second class, external medication is used in addition to the quartz lamp exposures. General exposures are given twice weekly until the eruption is completely gone. Treatment may then be cut down to once a week and later twice a month. The patient should report for an examination once a month. During these treatments, external medication is used. Following a warm bath and gentle removal of the scales, the following ointment is used:

℞

Olei candini
Acidi Salicylici
Sulphuris Praecipitatis aa ℥ss
Petrolati ℥

This ointment should be omitted the night before the quartz lamp exposures.

For the third class, external medication is also used, together with quartz light. These exposures and ointment applications are given in the same manner as described for the second class—the only change being the substitution of Chrysarobin gr xv in the preceding prescription for the Olei Cadini.

The above procedures, prescriptions, etc., are to be used as standard, and should be freely varied to meet the needs of each individual patient.

RESPIRATORY SYSTEM

MEDIASTINAL INFECTION

The Mediastinum as a Focus of Infection. W. L. McClure, M. D., Northwest. Med., 25:36-37, January, 1926.

The author describes the symptoms and physical findings that are usually presented in the type of patient under consideration. The roentgen findings are not in any way diagnostic, but assist in making the diagnosis and noting the progress.

Roentgen findings are mostly fluoroscopic and correspond to the usual findings of upper respiratory infections, principally areas of increased hilus density, bilateral and very frequently with one being markedly darker than the other; or peribronchial infiltration, varying from the simple types found with bronchitis to the various degrees of bronchiectasis. Occasionally areas of increased density are found throughout the lungs themselves, suggestive of bronchopneumonic spots or areas of unresolved lung inflammations. Glandular shadows are prominent. Shadows due to increased density in the mediastinal areas nearly always are to be found and occasionally a case of diffuse thickening, suggestive of the fibrosis described by Sante as cirrhosis, is seen.

The rather characteristic signs of tuberculosis are nearly always lacking, although when these signs suggestive of tuberculosis involvement, either recent or old, active or healed, are found, one should be very cautions about making a final diagnosis and still more cautious for treatment, for reasons which will appear later, until a definite diagnosis can be made.

This point is important. The thickening, densities and glands under the fluoroscope are *darker*, more extensive and irregular than is found in the average chest. Also, as treatment is instituted and the case progresses toward recovery, this unusual darkness tends to lessen and frequently disappears entirely; the lungs and bronchial tissues seem to lose their appearance of stiffness and rigidity; air enters the lungs tissue more freely and the thickened hilus, peribronchial and gland shadows move more freely with respiration.

By way of differential diagnosis, oral infections must be eliminated. Infected teeth and tonsils are to be inspected. Sinuses are to be transilluminated and radiographed. Hilus tuberculosis is to be considered. Early malignancies, especially lymphadenomata, are often accompanied by some degree of secondary infection and are difficult to eliminate. Chronic bronchitis, unresolved pneumonia, bronchiectasis, all must be considered. Renal, gallbladder, appendiceal and colon infections must be considered as a routine.

RESPIRATORY NEOPLASMS

Neoplasms of the Lungs and Bronchi. Peter Kerley, M. B., Ch. M., D. M. R. E., Brit. J. Radiol., 30:333-349, September, 1925.

Malignant diseases of the lungs have always been considered a rarity, but the author considers this incorrect. Of the 74 cases of carcinoma of the lung described by Otten, 64 were primary carcinomas, 2 primary sarcomas and 8 metastases. The age incidence varied from forty to sixty-five years.

The symptoms were variable. Persistent cough is common but not often complained of, hemoptysis is frequent. The textbook picture of prune juice sputum is seldom seen. Enlargement of the neck and swelling of the superficial thoracic veins are probably the result of pressure upon, or extension into the superior vena cava. Dyspnoea occurs late.

In his consideration of this pathological condition, the author divides carcinoma into types:

1. Pneumonic form of bronchial carcinoma is the most usual type. The lobe affected appears as a moderately dense shadow, invariably sharply limited by the interlobar fissure. The shadow

is rarely dense enough to obscure the ribs, and this, coupled with the fact that the border is sharp and the position unusual, are against the possibility of fluid.

The shadow lessens in intensity towards the apex and the lateral wall. The apical field may be quite clear, which is the reverse of what one usually expects in tuberculosis. But carcinoma is almost always accompanied by tuberculosis, hence the presence of tuberculous foci should be taken as a point in favor of and not against carcinoma.

The real difficulty in the diagnosis of this type lies in the differentiation from chronic pneumonia or actinomycosis. History and clinical symptoms help. Radiologically there is one important point, and that is the position of the arch of the aorta. In an infiltrative process such as pneumonia or actinomycosis, the arch is dragged in towards the affected side; in a neoplastic process it is pushed out. Another important point in the diagnosis is the position of the diaphram. In advanced cases it may be completely paralyzed, standing very high and immovable.

2. The hilum form of bhonchial carcinoma is not so common, but gives a more typical picture. The hilum is very dense, and enormously enlarged, often appearing five or six times its normal size. In shape it resembles a semicircle, from which fine, greyish, wavy striations into the lung, giving an appearance described as woolly infiltration. These striations are due to malignant infiltration of the perivascular and peribronchial lymphatics. A differential diagnosis has to be made from mediastinal tumor and hilum tuberculosis. A mediastinal tumor is usually roughly granular appearing, does not confine itself to the hilum, often shows itself on both sides of the mediastinum, and pushes the lung in front of it, rather than grows into the lung.

3. The nodular type of bronchial carcinoma is rare compared to the other two forms. Large, rather sharply outlined nodules are seen on one side of the thorax, and they communicate with the hilum through thin or thick dense shadows. The possibility of these nodules being metastatic is the first consideration, but they are not so sharply outlined as the metastases, and the intense peribronchial infiltration associated with them absolutely rules out the question of their being secondaries. Syphilis of the lungs will, however, cause difficulty.

4. An exceedingly rare type of lung carcinoma or sarcoma is the cavernous type. The presence of a huge, solitary cavity in one lung should always lead to suspicion, and if some slight tuberculous manifestations are seen in striking contrast to the huge cavity it by no means necessarily follows that the cavity is tuberculous. The differential diagnosis is practically impossible from phthisis or abscess of the lung, but there are two points that will help: (1) on a good plate very fine striations, dense and net-like, may be seen running to the hilus; (2) if a tuberculous or abscess cavity contains fluid, the level varies considerably from time to time as the contents of the cavity are coughed up.

5. Metastases to the lung, either isplated or disseminated. The former are the commoner and the same picture always, irrespective of the nature or position of the growth. The appearance of the x ray plate is that of a round or oval dense shadow, sharply outlined from the neighboring lung tissue. There may be any number present, but they all possess these characteristics. Metastases are embedded in the lung like a foreign body and unless they are numerous, they give rise to no pulmonary symptoms. Metastases are far commoner than generally believed.

With an absent history or finding of a primary growth consider echinococcus cyst, and watch for the characteristic hooklets to be coughed up.

6. Carcinomatosis, the disseminated form of metastasis, is infrequent, but may give rise to difficulty to differentiate from miliary tuberculosis. If it is one of the exceedingly rare cases of hematogenous disseminated carcinoma, the differential diagnosis can only be made in the postmortem room.

GENITO-URINARY SYSTEM

UTERINE BLEEDING

Use of Radium in Certain Types of Uterine Bleeding. Otis B. Wight, M. D., Northwest. Med., 24:554-558, November, 1925.

The causes of uterine bleeding are placed by the author into three general divisions: (1) Where it is due to intrinsic uterine pathology, as cancer of the cervix, polyp and fibroid; (2) where the uterus is normal and it is due to intrinsic disease, as salpingitis, tubal pregnancy, etc.; (3) where there is no gross internal or external pathology, the so-called "essential menorrhagia."

Radium can only and safely be used when the following conditions exist: (1) Where the uterus is more or less uniformly enlarged but not beyond the size of a three months pregnancy; (2) where there is no evidence of adnexal disease; (3) in women about or beyond the menopause.

Of the causes before enumerated the so-called essential menorrhagia is most amenable to radiation. The proper procedure is to give the patient gas so as to make an accurate examination possible, dilate, curette for diagnosis, saving the scrapings for examination. A capsule of radium is placed in the fundus and a dose of from 250 to 450 mg. hours given, depending on the age of the patient. The minimum dose can be used safely in girls from fourteen to fifteen years without danger of producing a permanent amenorrhea. The effect of the radium may come from one of three sources: (1) Through caustic effects on the endometrium; (2) destruction of the adventia of many of the capillaries, thus diminishing the blood supply; (3) possibly on the ovary, though the dose is so small that this perhaps may be questioned.

UROLOGY

Medical and Surgical Diathermy in Urology. Budd C. Corbus, M. D., J. Urology, 13:355-364, March, 1925.

Diathermy is produced by the d'Arsonval current, and is relatively low in voltage and high in amperage. In the bipolar application of this modality variations in the current density produce almost any degree of heat desired and localize it at will within the tissues. The degree of heat which is generated deep within the tissues is proportionate to the square of the amperage of current used; its density is determined by the size of the electrodes and the relative resistance the tissues offer to the passage of current. The greatest amount of heat is obtained midway between the electrodes if they are of equal size.

Two kinds of diathermy are used: medical diathermy produces a mild hyperemia, surgical diathermy causes coagulation and dessication.

Urologists are particularly fortunate in having two disease conditions to treat that are amenable to heat; namely, infectious of gonococcal origin and carcinoma. In the male such conditions as gonorrheal urethritis, prostatitis, epididymitis and periurethritis, are treated and in the female, gonorrheal endocervicitis, gonorrheal urethritis and infections of Skene's and Bartholin's glands of gonorrheal origin. With the same thermophore it is possible to treat gonococcal infections in both the male and female.

It has been shown that the gonococcus dies instantaneously in vitro when heated to a temperature of 108 degrees Fahrenheit. Santos has experimented upon himself and has shown that a temperature of 109 degrees is hardly felt within the urethra, but when the temperature is increased to 113 degrees it becomes intolerable. The endocervix has been repeatedly subjected to temperature of 116 degrees for forty minutes without the slightest discomfort or destruction.

Because of the fact that the gonococcus is so easily destroyed by heat, it is apparent that diathermy offers the most suitable method of treating gonorrheal infections of the cervix and Skene's and Bartholin's glands. With a single application of diathermy for fifty minutes to gonorrheal epididymitis, if the condition is seen early enough, there is prompt amelioration of pain and symptoms. This improvement is so marked, according to the writer, that one is justified in calling diathermy a specific for gonorrheal epididymitis.

In the treatment of carcinoma, diathermy also has an important part to play. Particularly carcinoma of the penis, bladder and prostate are benefited by the heat. Cancer cells are less thermo-resistant than normal body cells. Thermo-electrocoagulation is also advocated by the writer in the treatment of cancer of the prostate. By thermo-electrocoagulation cancer of the posterior lobe of the prostate may be done slowly and carefully. The perineal prostatectomy is accomplished by this method.

To Be Published Shortly

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by

A. R. HOLLENDER, M. D., and M. H. COTTLE, M. D.

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